

The background is a dark, textured surface featuring various mathematical symbols and numbers in a light gray, semi-transparent font. These include '98x3' at the top left, '3,69' at the top right, '7,5' on the middle left, '8' in the center, '98,2' on the middle right, '536/12' on the lower right, and '5.3' on the lower left. At the bottom, there is a faint image of a grid with handwritten mathematical formulas such as  $\frac{1}{x+1}$ ,  $\frac{1}{x^2}$ ,  $\sqrt{x}$ , and  $\frac{1}{(x+1)^2}$ .

# How to Calculate Quickly

Full Course in  
Speed Arithmetic

Henry **Sticker**

# **HOW TO CALCULATE QUICKLY**

(the art of calculation)

BY HENRY STICKER

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## PREFACE

Arithmetic is a science, but calculation is an art. Science is knowledge—art is skill. You have all the knowledge you could possibly need to determine that 57 times 25 equals 1425, but if you are asked to multiply 57 by 25 and cannot do this mentally in just about one second, you are not adept at the art of calculation.

Genuine skill in the calculating art can be acquired by any person of ordinary intelligence, no matter what his schooling may have been. To develop such skill is the purpose of this book. Special forms of short, graded exercises, performed for the most part mentally, lead the student by easy steps to a point where he will possess really exceptional calculating ability.

For instance, if you will look at Exercise No. 371 on page 191, you will find that you are expected to perform mentally such multiplications as 696 times 858, 858 times 878, etc. These are not “trick” examples—the student who systematically performs the practice examples presented in this book will be able to do many kinds of examples of this degree of difficulty by his sheer ability to hold and manipulate figures *in his head*.

*How* is this skill developed? Essentially by developing *number sense*. Number sense consists in the ability to recognize the relations that exist between numbers considered as whole quantities, and to work with the thought of their broad relations always uppermost. Number sense is possessed by many people in all walks of life—particularly by accountants, bookkeepers, estimators, cashiers, storekeepers and the like. On the other hand, it is absent in many who have an excellent understanding of advanced mathe-

matics. The engineering professions are full of those who require slide rules to perform calculations which the average billing clerk would do mentally.

To give an example of what is meant by number sense, suppose you were asked to multiply mentally 11625 by 12. If you felt at all competent to try to do so, you would probably (unless you are the exceptional case) proceed like this: 12 times 5 is 60, remember 0 and carry 6; 12 times 2 is 24, put 0 before the other 0 and carry 3, etc. In this way you would eventually arrive at the correct answer—if you did not get all mixed up in the meantime; but at best you would take a long time, because number sense would have played no part whatever in your awkward method of approaching this very simple little problem.

Suppose now that we introduce a little of this number sense—suppose that instead of dealing with plain figures, you were told to imagine that you had sold twelve machines on each of which you made a commission of \$11.62½. As soon as money enters into the matter you immediately see the whole picture in a different light. If you were asked *approximately* how much your commissions amounted to, you would figure quick as a flash that 11 times 12 is 132, and you would probably answer instantly that you had made something over \$132. If you were then asked *how much* over \$132, you would either figure that 62½¢ are  $\frac{5}{8}$  of one dollar, or else that this amount is equal to half a dollar plus  $\frac{1}{8}$  of a dollar. You would not take long in determining that the excess over \$132 comes to \$7½, and that therefore the

total amount received would be  $\$139\frac{1}{2}$  or  $\$139.50$ .

Why not apply to numbers "in the raw" the same methods that you use when dealing with small amounts of dollars and cents? It is no more difficult to multiply  $11\frac{5}{8}$  thousands by 12 than  $11\frac{5}{8}$  dollars. If  $11\frac{5}{8}$  dollars times 12 is  $139\frac{1}{2}$  dollars, then  $11\frac{5}{8}$  thousands times 12 is  $139\frac{1}{2}$  thousands, or 139,500.

From this illustration you may correctly infer that the person with number sense works very largely *from left to right* instead of from right to left. Left-to-right calculation is of the essence of number sense. Countless practical people know this, yet the art of left-to-right calculation is never taught in the schools, and is, in fact, rarely mentioned in books of any kind.

Step-by-step instruction and practice in this neglected art of left-to-right calculation constitutes the greater part of the substance of this book. Methods of this kind are applied not only to multiplication but to all the fundamental operations. By means of such methods, for instance, you learn to add two columns of figures at a time, and you even get a little practice in three-column addition. You are also taught comparable methods of subtraction and division.

In addition to the exercises having to do with left-to-right calculation, there are many that are based on an *extension of the multiplication table*. You are taught by easy stages to use all the numbers up to 25 as direct multipliers—that is to say, you acquire a *complete* knowledge of the multiplication table up to 25 times 25.

The subject of fractions is treated with special reference to the addition and subtraction of the

fractions that are most commonly met with in everyday work. The object here is to enable the student to memorize the answers to the kinds of problems that are ordinarily figured out over and over again.

The exercises dealing with decimals are designed to give the student a large workable fund of knowledge of the decimal equivalents of fractions. Memory work includes twelfths and sixteenths, and there is practice in the rapid calculation of thirty-seconds and twenty-fourths.

The final broad subject developed in this book is "short cuts." These are of the highest value in developing a general understanding of numbers.

The subject matter of this book is limited to the four fundamental operations, with the inclusion of fractions and decimals. No attempt is made to consider the various fields of arithmetical application. Skill in calculation pure and simple is the only goal.

The exercises, nearly four hundred in number, are for the most part very short. Few should take more than ten minutes to do, and many will take less. As progress is by graded steps, the instruction is in small "doses." The book, accordingly, can be used with profit whenever you happen to have a few free minutes. Its pocket size, moreover, makes it all the more suitable for odd-moment study.

Taken as a whole, this book will prove valuable to anybody engaged in work or study that requires any considerable amount of arithmetical calculation. It is especially recommended to heads of departments in industrial and commercial organizations, for general distribution to the members of their staffs.

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## THE PLAN OF THIS BOOK

The subject matter here presented might have been divided into sections on addition, subtraction, multiplication, etc., in the manner usual to text-books on arithmetic. Because, however, of the special purpose of this book, no such division is made. The general plan is to have several branches proceed simultaneously. Progress is not from subject to subject but from less to more difficult calculation.

For each of the fundamental divisions of arithmetic there is a general introduction—for instance, *Addition in General* on page 3 . In these introductions the special objects sought are described, as well as the methods by which these objects are attained. The student, therefore, always has a clear view of the ultimate aims of his studies and knows how the work immediately in hand fits into the general plan.

Wherever anything new is introduced, it is clearly explained and illustrated. Usually the exercises that go with each explanation are spread through many succeeding pages. In a large number of cases the exercise calls for work with the numbers in a certain list or table (for instance, Table I on page 7 ). The same lists of numbers are used for various kinds of calculation. This method of presentation makes possible the remarkably great number (about 15,000) of practice examples that are included.

## ADDITION IN GENERAL

Two main objects are sought. The first is to add by single columns, grouping three successive numbers at a time; the second is to add two columns at a time:

Take the following sum:

$$\begin{array}{r} 26 \\ 43 \\ 84 \\ 72 \\ 96 \\ 27 \\ 42 \\ 35 \\ 68 \\ 64 \\ 37 \\ \hline 97 \end{array}$$

By the first method, starting at the top of the units' column, we would add these numbers thus: (sum of the first three figures) 13 (+ sum of the next three figures, 15) 28 (+ 15) 43 (+ 18) 61; write 1 and carry 6; (6 + 14) 20 (+ 18) 38 (+ 13) 51 (+ 18) 69; total, 691.

By the second method, starting at the top, we would add both columns simultaneously thus: (26 + 43) 69 (+ 84) 153 (+ 72) 225 (+ 96) 321 (+ 27) 348 (+ 42) 390 (+ 35) 425 (+ 68) 493 (+ 64) 557 (+ 37) 594 (+ 97) 691.

In actual practice, very rapid addition is possible by either method, and you will be left free

to choose whichever you prefer. You should, however, learn both.

How do you proceed to learn these methods? You were taught—or should have been taught—at school that speed in addition is acquired by combining pairs of successive numbers that add up to 10. It is at this point that we start, because this is the simplest way in which grouped numbers can be added to a preceding sum. You are given short columns of numbers to be added by incidentally selecting such pairs of successive figures as make 10. In succeeding exercises the columns are lengthened, and you are also asked to group any pairs that add up to less than 10.

In the meantime, you will have been doing exercises in mentally adding all the numbers from 11 to 18 to all the numbers from 1 to 99. Since no pair of figures in a column can add to more than 18, this amount of practice will enable you to add *any* pair of successive figures in a column to a previous sum, and hence to add the entire column by taking two figures at a time.

You are similarly taught to add trios of numbers that make 10 or less than 10, and to add any number from 19 to 27 to any number from 1 to 99. With this practice you will be able to add *any* column by taking three figures at a time.

If you can quickly add any number from 1 to 27 to another number, you will not find it difficult to add numbers greater than 27 in the same manner. You are accordingly ready now to add two columns at a time. Exercises in this method are introduced, and these are gradually increased in difficulty.

Toward the end of the book there are some exercises in three-column addition—just enough to demonstrate that it will be possible for *you* to add this way if you wish to use this method.

There are examples in addition of still another kind. These are not included for practice in addition as such but have a special bearing on the art of multiplying mentally. We need not consider sums of this kind at this point.

You will note that in the exercises in one-column addition you are alternately instructed to *add from the top down* and to *add from the bottom up*. In practical work it is of course immaterial in which direction addition is performed. You should, however, be able to add with equal facility in either direction, and by alternating as suggested you will get the necessary practice.

### Exercise No. 1

#### Pairs Adding to 10

Add the following columns by grouping pairs of numbers that make 10. *Add from the top down.*

Thus you would add the first column by saying to yourself: 7, 17, 22, 32.

Do not consciously repeat in your mind anything but the successive totals. That is to say, do *not* add this column thus:  $7 + 10, 17, +5, 22, +10, 32$ .

For another illustration of the correct method, take the second example. This is added thus: 8, 18, 20, 30.

Write your answers in succession on a piece of paper and compare them with the correct answers on page 154. (A good plan is to place the edge of your paper immediately under the examples, write the answers along this edge, and fold it under as it becomes used up.)

# 6 THE ART OF CALCULATION

<b>1. 7</b>	<b>2. 8</b>	<b>3. 4</b>	<b>4. 5</b>	<b>5. 6</b>	<b>6. 5</b>
6	9	5	2	4	5
4	1	5	8	6	3
5	2	5	4	3	6
1	3	4	1	2	4
<u>9</u>	<u>7</u>	<u>6</u>	<u>9</u>	<u>8</u>	<u>8</u>

<b>7. 5</b>	<b>8. 3</b>	<b>9. 8</b>	<b>10. 6</b>	<b>11. 5</b>	<b>12. 9</b>
4	2	2	9	5	6
6	7	9	1	3	4
6	3	8	5	2	8
3	1	1	4	4	1
<u>7</u>	<u>2</u>	<u>9</u>	<u>6</u>	<u>6</u>	<u>7</u>

<b>13. 3</b>	<b>14. 1</b>	<b>15. 6</b>	<b>16. 6</b>	<b>17. 1</b>	<b>18. 7</b>
7	9	4	3	3	6
6	9	4	7	7	2
2	1	5	2	9	8
8	5	4	2	3	5
<u>8</u>	<u>4</u>	<u>3</u>	<u>5</u>	<u>7</u>	<u>5</u>

<b>19. 1</b>	<b>20. 1</b>	<b>21. 6</b>	<b>22. 3</b>	<b>23. 7</b>	<b>24. 4</b>
9	5	4	4	5	9
4	5	7	6	5	1
3	9	6	4	3	3
9	4	3	6	6	2
<u>1</u>	<u>6</u>	<u>7</u>	<u>3</u>	<u>2</u>	<u>8</u>

Table I

## Numbers from 1 to 99

1	8	15	22	29	36	43	50
57	64	71	78	85	92	99	6
13	20	27	34	41	48	55	62
69	76	83	90	97	4	11	18
25	32	39	46	53	60	67	74
81	88	95	2	9	16	23	30
37	44	51	58	65	72	79	86
93	7	14	21	28	35	42	49
56	63	70	77	84	91	98	5
12	19	26	33	40	47	54	61
68	75	82	89	96	3	10	17
24	31	38	45	52	59	66	73
80	87	94					

## Exercise No. 2

## Mental Addition

Add 11 to each of the numbers in Table I above.

Use *left-to-right* addition, which is performed by first adding the tens of one number to the whole of another. In other words, starting with the number in the table you first add 10 and then 1. A few illustrations will be in order:

15 + 11: say 15, 25, 26;

22 + 11: say 22, 32, 33;

29 + 11: say 29, 39, 40;

99 + 11: say 99, 109, 110.

Work down the columns—not across the page. Write down your answers and compare them with those on page 154.

## Exercise No. 3

## Pairs Adding to 10

Group all pairs of successive numbers that make 10.

*Add from the bottom up.*

1. 7	2. 6	3. 5	4. 9	5. 6	6. 3
8	4	2	7	7	1
4	5	5	6	9	6
6	2	4	4	1	4
5	4	6	8	3	4
3	5	6	8	4	1
5	4	7	9	6	8
5	1	3	1	3	2
1	2	4	1	8	9
8	8	8	7	5	6
2	7	2	5	2	4
<u>5</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>8</u>	<u>7</u>

7. 4	8. 8	9. 4	10. 6	11. 9	12. 3
7	2	4	5	8	7
3	9	3	7	8	6
8	1	2	3	2	6
3	5	4	4	7	1
2	3	6	2	1	2
2	8	1	8	9	7
8	5	6	9	6	6
1	5	4	1	5	4
9	2	9	3	5	5
1	6	3	2	5	5
<u>9</u>	<u>5</u>	<u>7</u>	<u>1</u>	<u>4</u>	<u>6</u>

<b>13. 7</b>	<b>14. 3</b>	<b>15. 9</b>	<b>16. 1</b>	<b>17. 3</b>	<b>18. 6</b>
4	7	1	8	6	9
6	8	6	7	4	1
3	2	3	5	2	7
2	8	7	5	8	7
6	5	5	6	5	3
4	5	4	7	1	2
1	8	6	3	4	1
8	2	4	5	1	5
3	7	3	4	9	2
7	1	2	4	3	9
<u>9</u>	<u>9</u>	<u>9</u>	<u>6</u>	<u>7</u>	<u>1</u>

## Exercise No. 4

### Mental Addition

Add 12 to the numbers in Table I on page 7.

To illustrate:

15 + 12: say 15, 25, 27;

22 + 12: say 22, 32, 34;

29 + 12: say 29, 39, 41;

99 + 12: say 99, 109, 111.

## Exercise No. 5

### Mental Addition

Add 13 to the numbers in Table I on page 7.

## Exercise No. 6

### Mental Addition

Add 14 to the numbers in Table I on page 7.



**Exercise No. 7****Mental Addition**

Add 15 to the numbers in Table I on page 7.

**Exercise No. 8****Pairs Adding to 10 or Less**

The grouping of pairs of successive numbers is now to be extended to include any that add to less than 10 as well as any that add to 10. That is to say, as you add each column watch to see whether any two successive numbers add to either 10 or less than 10, and if they do, make one addition of them to the preceding sum.

For this exercise use the columns of numbers in Exercise No. 1 and compare your answers with those for Exercise No. 1. *Add from the top down.*

To illustrate, the first column is added: 7, 17, 23, 32; the second: 8, 18, 23, 30; the third: 9, 19, 29.

**Exercise No. 9****Mental Addition**

Add 16 to each of the numbers in Table I on page 7.

**Exercise No. 10****Mental Addition**

Add 17 to each of the numbers in Table I on page 7.

**Exercise No. 11****Pairs Adding to 10 or Less**

Add the columns in Exercise No. 3 by grouping all pairs of successive numbers that add to 10 or less than 10. *Add from the bottom up.*

**Exercise No. 12****Mental Addition**

Add 18 to each of the numbers in Table I on page 7.

**Exercise No. 13****Adding Single Columns by Pairs**

Add the following by single columns, taking pairs of successive numbers at a time. *Add from the top down.* The first example would be added: 5, 14, 25, write 5 and carry 2; 2, 12, 27, 36; answer 365.

1. 43	2. 29	3. 58	4. 87	5. 16
62	75	33	62	91
78	36	65	94	33
81	69	98	27	56
14	43	72	89	29
<u>87</u>	<u>16</u>	<u>45</u>	<u>74</u>	<u>32</u>

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6. 19	7. 48	8. 77	9. 36	10. 63
99	21	29	49	78
36	68	49	94	96
71	29	11	59	44
61	18	51	22	41
<u>41</u>	<u>25</u>	<u>53</u>	<u>27</u>	<u>88</u>

11. 33	12. 21	13. 34	14. 24	15. 16
39	79	43	14	44
43	74	27	11	49
51	85	53	15	54
55	63	17	75	49
<u>36</u>	<u>82</u>	<u>57</u>	<u>78</u>	<u>99</u>

16. 31	17. 28	18. 63	19. 32	20. 63
35	63	35	65	28
67	21	12	16	76
44	34	31	67	45
84	52	81	73	69
<u>42</u>	<u>56</u>	<u>15</u>	<u>55</u>	<u>62</u>

21. 85	22. 54	23. 14	24. 68	25. 69
56	42	27	42	28
75	68	54	28	45
37	13	85	34	37
73	99	59	83	71
<u>24</u>	<u>84</u>	<u>69</u>	<u>16</u>	<u>91</u>

**Exercise No. 14****Mental Addition**

Add 19 to each of the numbers in Table I on page 7.

**Exercise No. 15****Adding Single Columns by Pairs**

Add the following by single columns, taking pairs of successive numbers at a time. *Add from the bottom up.* The first example would be added: 11, 15, 27, 42, 49, 60, write 0 and carry 6; 6, 17, 24, 37, 43, 54, 62; answer, 620.

<b>1. 27</b>	<b>2. 81</b>	<b>3. 92</b>	<b>4. 16</b>	<b>5. 29</b>
64	28	92	14	27
32	75	29	14	25
85	43	86	31	25
46	96	54	97	32
29	57	18	65	19
78	51	68	29	76
64	89	62	79	51
31	75	11	73	12
43	42	86	22	84
75	54	53	58	33
<u>46</u>	<u>86</u>	<u>65</u>	<u>64</u>	<u>19</u>

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6. 43	7. 58	8. 74	9. 91	10. 99
51	54	69	85	13
38	62	65	91	96
36	49	74	76	13
37	47	71	85	87
33	36	58	82	96
41	34	47	69	93
87	52	35	58	87
62	98	63	37	69
23	73	31	74	47
95	34	84	42	75
<u>44</u>	<u>27</u>	<u>45</u>	<u>95</u>	<u>53</u>

11. 19	12. 39	13. 51	14. 63	15. 84
12	41	55	62	99
26	23	52	62	75
18	37	34	63	73
24	29	48	45	74
24	35	56	59	56
18	98	46	67	82
15	29	31	57	78
98	26	53	42	68
36	91	37	64	53
85	48	13	48	59
<u>49</u>	<u>96</u>	<u>59</u>	<u>24</u>	<u>57</u>

**Exercise No. 16****Mental Addition**

Add 20 to each of the numbers in Table I on page 7.

**Exercise No. 17****Adding Single Columns by Pairs**

Add the following by single columns, taking pairs of successive numbers at a time. *Add from the top down.*

1. 51	2. 42	3. 41	4. 34	5. 33
30	53	73	36	81
96	90	32	97	28
24	79	12	19	39
25	87	62	69	43
75	76	11	94	10
48	92	44	83	85
49	52	84	37	47
93	45	70	38	29
80	72	40	46	14
13	18	61	17	95
58	63	67	23	10
88	22	56	66	82
86	21	16	64	31
20	59	98	89	77
99	91	55	68	74
59	15	27	60	35
<u>65</u>	<u>78</u>	<u>54</u>	<u>23</u>	<u>84</u>

6. 61	7. 34	8. 39	9. 36	10. 17
81	90	32	25	66
82	86	21	97	28
24	85	49	96	74
59	16	87	52	84
95	58	33	30	15
53	64	48	63	67
37	47	11	94	93
27	23	60	35	73
31	45	20	62	69
92	44	70	51	10
83	65	26	91	29
80	72	55	88	79
38	68	57	43	78
54	42	12	19	22
98	40	46	14	13
41	89	75	56	76
<u>77</u>	<u>99</u>	<u>18</u>	<u>42</u>	<u>39</u>

**Exercise No. 18****Mental Addition**

Add 21 to each of the numbers in Table I on page 7.

## SUBTRACTION IN GENERAL

In keeping with the general object of this book, the succeeding exercises in subtraction are performed by left-to-right methods.

When subtraction is performed on paper there is no special advantage in working from left to right instead of from right to left. Paper practice in the former method, however, fits in with the broad purpose of developing number sense.

When it comes to doing subtraction mentally, the left-to-right method is natural and logical. Thus, if you had started the day with \$17.43 in your pocket, and if you wanted to figure without paper and pencil how much you had left after spending \$5.89, you would not be likely to start by subtracting 9 from 13. You would probably calculate that if you had spent the full \$6, you would have \$11.43 left, but that having spent 11¢ less than \$6, the remainder comes to 11¢ more than \$11.43, or \$11.54.

In considering the specific aims of these exercises in subtraction, look first at the written examples. If you will glance at the first exercise that follows, and which is included merely to familiarize you with the idea of working from left to right, you will see that in every case the figures in the subtrahend (lower number) are smaller than those in the minuend. The examples are all of the type of

$$\begin{array}{r} 54 \\ -23 \\ \hline \end{array}$$



and you can determine the answers faster than you can write them down. If, however, you take the example

$$\begin{array}{r} 685 \\ - 356 \\ \hline \end{array}$$

and try to write the answer in the same way, you will run into trouble when you reach the final figures at the right because 6 is greater than 5. What to do about cases of this kind is the subject of the instruction. The exercises take into account the possible variations that may occur in numbers of two and three places.

The examples in mental subtraction are performed by methods altogether different from those that apply to written work. There are two such methods, of which one has already been illustrated. We subtracted \$5.89 from \$17.43 by taking \$6 from \$17.43 and then adding to \$11.43 the difference between \$6 and \$5.89, obtaining as our answer \$11.43 + \$.11, or \$11.54. To do the same example mentally by the other method, we calculate that if you had started with \$17 even, you would have \$11.11 left; but you had \$.43 more than \$17 at the start, and therefore the actual remainder is \$11.11 + \$.43, or \$11.54. One method is as good as the other. Examples are given that carry the practice in both methods as far as numbers involving hundreds of dollars and odd cents.

Incidentally, you should know that ordinary written subtraction is commonly performed by two entirely different methods—the *borrow*

method and the *carry* method. The borrow method is taught almost exclusively in this country today, but in times past the carry method had similar acceptance.

Take the example

$$\begin{array}{r} 856 \\ -569 \\ \hline 287 \end{array}$$

To do this by the borrow method you reason: 9 from 16 leaves 7, 6 from 14 leaves 8, 5 from 7 leaves 2; answer, 287. To do the same example by the carry method you would say: 9 from 16 leaves 7, 7 from 15 leaves 8, 6 from 8 leaves 2; answer, 287.

You should understand both these methods (neither of which has any clear advantage over the other), though you continue to use regularly whichever one comes most naturally to you. In the illustrations given in this book the borrow method is followed because it is the more familiar to the majority of people.

### Exercise No. 19

#### Left-to-Right Subtraction

Perform the following subtractions by directly writing your answers from left to right.

1. 67	2. 48	3. 41	4. 78	5. 64
<u>55</u>	<u>14</u>	<u>20</u>	<u>22</u>	<u>31</u>

6. 98	7. 53	8. 65	9. 28	10. 66
<u>20</u>	<u>41</u>	<u>52</u>	<u>16</u>	<u>45</u>

11. 99 <u>92</u>	12. 69 <u>35</u>	13. 83 <u>31</u>	14. 32 <u>21</u>	15. 93 <u>41</u>
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**Exercise No. 20****Left-to-Right Subtraction**

Directly write your answers from left to right.

To take the first example, you simply note that 6 is greater than 4, and therefore the 5 in the minuend becomes a 4: 2 from 4 leaves 2 (writing 2), 6 from 14 leaves 8 (writing 8); answer 28.

1. 54 <u>26</u>	2. 47 <u>19</u>	3. 51 <u>39</u>	4. 46 <u>27</u>	5. 52 <u>37</u>
6. 84 <u>58</u>	7. 37 <u>18</u>	8. 35 <u>17</u>	9. 72 <u>24</u>	10. 50 <u>29</u>
11. 83 <u>44</u>	12. 56 <u>39</u>	13. 71 <u>45</u>	14. 96 <u>38</u>	15. 77 <u>49</u>
16. 94 <u>76</u>	17. 45 <u>16</u>	18. 48 <u>29</u>	19. 68 <u>39</u>	20. 71 <u>52</u>

**Exercise No. 21****Mental Addition**

Add 22 to each of the numbers in Table I on page 7.

**Exercise No. 22****Trios that Add to 10 or Less**

This exercise introduces the idea of taking in three suc-

cessive numbers at a glance. Every column contains four groups of three numbers each; each of these groups adds to 10 or less. Add by combining these groups. *Add from the top down.*

1. 27	2. 14	3. 64	4. 57	5. 34
21	11	21	31	31
11	12	13	12	11
45	33	44	56	54
41	21	42	21	42
13	13	22	23	13
65	25	43	56	52
12	21	32	12	31
12	24	33	12	22
25	35	78	45	44
11	12	11	21	31
<u>11</u>	<u>13</u>	<u>11</u>	<u>12</u>	<u>14</u>

6. 41	7. 62	8. 43	9. 21	10. 33
21	32	33	11	12
26	12	24	15	15
31	61	21	12	63
31	21	11	11	11
22	23	27	14	24
81	52	43	33	42
11	21	11	11	22
11	16	45	23	44
72	44	62	24	43
21	12	12	21	32
<u>13</u>	<u>14</u>	<u>15</u>	<u>25</u>	<u>33</u>

**Exercise No. 23****Left-to-Right Subtraction**

Sight practice with pairs of three-place numbers. No borrowings are involved. Work from left to right.

1. 754	2. 827	3. 468	4. 659	5. 746
<u>233</u>	<u>614</u>	<u>235</u>	<u>338</u>	<u>415</u>

6. 928	7. 675	8. 558	9. 649	10. 458
<u>615</u>	<u>423</u>	<u>146</u>	<u>437</u>	<u>328</u>

11. 727	12. 898	13. 753	14. 462	15. 941
<u>605</u>	<u>457</u>	<u>321</u>	<u>111</u>	<u>720</u>

**Exercise No. 24****Mental Addition**

Add 23 to each of the numbers in Table I on page 7.

**Exercise No. 25****Mental Addition**

Add 24 to each of the numbers in Table I on page 7.

## Exercise No. 26

## Adding Single Columns by Pairs

Take successive pairs at a time. *Add from the top down.*

1. \$40.72	2. \$35.51	3. \$27.13	4. \$47.15
33.32	56.28	96.92	10.20
98.21	43.90	22.07	36.09
29.05	49.44	38.71	59.73
53.69	84.57	58.94	55.70
79.66	99.61	34.88	85.54
83.97	24.25	60.26	31.78
45.77	16.23	65.14	11.12
42.63	80.17	18.19	52.48
46.68	82.67	89.30	87.81
64.39	86.93	41.75	74.01
<u>37.62</u>	<u>91.76</u>	<u>50.95</u>	<u>25.60</u>

5. \$79.45	6. \$77.52	7. \$48.68	8. \$88.09
85.30	54.05	49.99	44.80
70.46	61.65	14.78	75.03
83.73	76.29	11.12	36.53
69.97	74.43	90.55	95.96
34.21	38.10	17.18	62.39
64.81	87.37	15.50	82.01
20.72	63.25	56.47	26.13
60.26	32.93	67.06	33.28
31.57	22.98	19.16	42.71
59.86	89.84	41.40	94.66
<u>58.35</u>	<u>91.23</u>	<u>56.15</u>	<u>10.34</u>

## Exercise No. 27

## Left-to-Right Subtraction

In these examples, in the vertical pairs of figures at the extreme right the subtrahend is greater than the minuend, reducing by 1 the tens' figure of the minuend.

Taking the first example, we note that the tens' figure of the minuend will become a 4 instead of a 5; 5 from 7 leaves 2, 3 from 4 leaves 1, 9 from 14 leaves 5; answer 215.

1. 754	2. 863	3. 528	4. 642	5. 995
<u>539</u>	<u>448</u>	<u>319</u>	<u>313</u>	<u>217</u>

6. 422	7. 323	8. 676	9. 266	10. 583
<u>313</u>	<u>109</u>	<u>428</u>	<u>138</u>	<u>346</u>

11. 912	12. 365	13. 744	14. 390	15. 555
<u>509</u>	<u>259</u>	<u>619</u>	<u>265</u>	<u>419</u>

16. 983	17. 696	18. 472	19. 713	20. 626
<u>779</u>	<u>587</u>	<u>329</u>	<u>606</u>	<u>318</u>

21. 718	22. 683	23. 951	24. 648	25. 873
<u>409</u>	<u>246</u>	<u>229</u>	<u>539</u>	<u>358</u>

26. 715	27. 582	28. 246	29. 997	30. 737
<u>506</u>	<u>246</u>	<u>139</u>	<u>129</u>	<u>318</u>

## Exercise No. 28

## Mental Addition

Add 25 to each of the numbers in Table I on page 7.

**Exercise No. 29****Mental Addition**

Add 26 to each of the numbers in Table I on page 7.

**Exercise No. 30****Mental Addition**

Add 27 to each of the numbers in Table I on page 7.

**Exercise No. 31****Trios that Add to 20 or Less**

In the separate columns of the following examples the successive groups of three figures add to some number between 11 and 20. Add by combining these groups of three. *Add from the top down.*

The first example would be added: 16, 30, 41, 61, write 1 and carry 6; 6, 18, 30, 46, 62; answer 621.

1. 23	2. 31	3. 12	4. 24	5. 24
46	46	84	64	74
67	46	89	74	78
21	12	33	35	35
55	24	43	45	55
58	97	78	95	78
22	13	13	14	14
54	73	37	45	44
95	86	99	75	99
12	23	13	25	25
69	57	88	65	35
<u>99</u>	<u>77</u>	<u>98</u>	<u>86</u>	<u>69</u>



6. 33	7. 32	8. 24	9. 34	10. 24
36	44	67	54	75
98	58	69	56	85
11	13	36	25	35
25	33	47	25	56
89	77	87	89	86
13	23	13	24	14
77	57	48	64	55
75	88	69	97	56
23	31	14	35	25
56	46	99	55	36
<u>69</u>	<u>68</u>	<u>98</u>	<u>67</u>	<u>77</u>

### Exercise No. 32

#### Left-to-Right Subtraction

In the type of example given here we see by inspection that the subtrahend has a larger figure than the minuend in the tens' place, reducing by 1 the hundreds' figure of the minuend. To take the first example: 5 from 6 leaves 1, 9 from 15 leaves 6, 3 from 4 leaves 1; answer 161.

Subtract from left to right.

1. 754	2. 648	3. 262	4. 548	5. 629
<u>593</u>	<u>356</u>	<u>191</u>	<u>357</u>	<u>458</u>
6. 856	7. 435	8. 468	9. 914	10. 765
<u>792</u>	<u>183</u>	<u>271</u>	<u>291</u>	<u>481</u>

11. 787 <u>693</u>	12. 547 <u>160</u>	13. 341 <u>171</u>	14. 112 <u>51</u>	15. 783 <u>190</u>
16. 486 <u>291</u>	17. 888 <u>494</u>	18. 489 <u>194</u>	19. 944 <u>452</u>	20. 842 <u>161</u>

## Exercise No. 33

## Left-to-Right Subtraction

In these examples the tens and the units are larger in the subtrahend than in the minuend, thus reducing by 1 both the hundreds and the tens of the minuend. Taking the first example: 2 from 6 leaves 4, 8 from 14 leaves 6, 9 from 14 leaves 5; answer, 465.

1. 754 <u>289</u>	2. 773 <u>194</u>	3. 413 <u>249</u>	4. 484 <u>298</u>	5. 342 <u>189</u>
6. 626 <u>578</u>	7. 787 <u>298</u>	8. 383 <u>197</u>	9. 867 <u>379</u>	10. 672 <u>295</u>
11. 918 <u>589</u>	12. 666 <u>197</u>	13. 586 <u>298</u>	14. 232 <u>176</u>	15. 515 <u>299</u>
16. 353 <u>169</u>	17. 428 <u>179</u>	18. 856 <u>779</u>	19. 481 <u>192</u>	20. 318 <u>149</u>

**Exercise No. 34****Adding Single Columns by Pairs**

Add the following by single columns, taking pairs of successive numbers at a time. *Add from the bottom up.*

<b>1. \$14.44</b>	<b>2. \$80.54</b>	<b>3. \$74.43</b>	<b>4. \$43.93</b>
38.42	33.20	67.27	32.06
72.09	13.40	18.02	94.34
61.90	55.95	21.60	97.86
63.26	10.17	25.98	30.29
56.78	75.79	96.45	36.47
73.76	77.52	89.84	70.66
62.58	39.51	11.12	35.07
91.28	83.85	64.48	81.68
31.41	87.19	19.92	49.37
71.15	59.57	22.53	69.16
50.82	24.23	65.99	57.84
22.78	94.70	66.75	53.69
33.34	61.90	11.54	96.17
25.12	50.05	74.45	36.03
92.49	82.98	55.62	30.35
58.43	93.63	95.37	39.51
<u>75.64</u>	<u>20.67</u>	<u>72.71</u>	<u>48.15</u>

5. \$22.78	6. \$94.70	7. \$66.75	8. \$79.53
69.33	34.61	90.72	71.09
48.14	27.10	80.11	54.96
17.81	68.47	73.29	59.15
44.88	76.13	56.25	50.91
40.18	31.05	74.45	57.42
19.02	26.30	35.58	43.93
63.95	37.86	24.38	32.23
89.16	46.65	39.51	85.64
99.08	20.67	84.36	28.41
87.83	92.49	82.98	55.01
77.52	21.60	92.13	16.46
22.78	56.25	49.12	50.91
40.18	31.82	94.70	98.55
66.75	62.77	52.05	74.79
53.45	69.33	34.57	21.65
60.39	51.85	64.61	90.72
<u>71.09</u>	<u>48.15</u>	<u>27.10</u>	<u>80.06</u>

### Exercise No. 35

#### Left-to-Right Subtraction

This exercise illustrates a principle: if a figure in the subtrahend is the same as the one above it in the minuend, the effect on the minuend will depend on whether or not a borrowing has been necessary with the next figure to the right.

In the first example we see that because 9 is greater than 4, the 5 in the minuend becomes a 4, and since 5 is greater than this the 7 in the minuend becomes a 6. We perform the subtraction thus: 3 from 6 leaves 3, 5 from 14 leaves 9, 9 from 14 leaves 5; answer, 395.

1. 754	2. 655	3. 251	4. 546	5. 592
<u>359</u>	<u>358</u>	<u>159</u>	<u>247</u>	<u>294</u>

6. 862 <u>667</u>	7. 444 <u>146</u>	8. 968 <u>569</u>	9. 773 <u>279</u>	10. 763 <u>266</u>
11. 832 <u>536</u>	12. 233 <u>139</u>	13. 983 <u>488</u>	14. 572 <u>278</u>	15. 656 <u>357</u>
16. 395 <u>197</u>	17. 856 <u>659</u>	18. 645 <u>248</u>	19. 721 <u>428</u>	20. 941 <u>249</u>
21. 527 <u>329</u>	22. 863 <u>569</u>	23. 985 <u>389</u>	24. 267 <u>168</u>	25. 843 <u>448</u>

**Exercise No. 36****Trios that Add to 27 or Less**

The groups of three here add to numbers between 21 and 27. Add by combining these groups. *Add from the top down.*

1. 36	2. 63	3. 47	4. 65	5. 47
98	79	87	78	97
99	89	98	98	99
69	86	74	87	75
99	89	78	87	78
99	89	79	99	89
56	33	67	54	49
89	99	77	89	89
89	99	97	99	99
73	67	84	77	75
79	97	88	87	78
<u>99</u>	<u>97</u>	<u>99</u>	<u>88</u>	<u>78</u>

6. 55	7. 68	8. 56	9. 68	10. 56
88	88	87	88	98
89	88	99	99	98
77	85	78	96	78
78	99	88	98	89
98	99	89	98	99
65	57	96	68	66
89	98	97	89	78
89	99	98	99	89
87	76	78	96	84
98	87	78	97	88
<u>98</u>	<u>98</u>	<u>88</u>	<u>99</u>	<u>89</u>

## Exercise No. 37

## Left-to-Right Subtraction

In these examples another consideration arises: the tens' figure in the minuend is 0; when 1 is borrowed to make possible the subtraction of the units, the tens in the minuend become 9 and the hundreds are also reduced by 1.

To illustrate with the first example: 3 from 6 leaves 3, 5 from 9 leaves 4, 7 from 14 leaves 7; answer, 347.

Subtract from left to right.

1. 704 <u>357</u>	2. 307 <u>118</u>	3. 806 <u>457</u>	4. 204 <u>126</u>	5. 404 <u>297</u>
6. 808 <u>549</u>	7. 706 <u>517</u>	8. 308 <u>189</u>	9. 302 <u>236</u>	10. 203 <u>115</u>
11. 800 <u>585</u>	12. 501 <u>323</u>	13. 300 <u>122</u>	14. 805 <u>796</u>	15. 601 <u>374</u>

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16. 902	17. 500	18. 408	19. 700	20. 207
<u>793</u>	<u>386</u>	<u>159</u>	<u>466</u>	<u>178</u>

21. 807	22. 603	23. 200	24. 600	25. 300
<u>509</u>	<u>319</u>	<u>162</u>	<u>224</u>	<u>171</u>

### Exercise No. 38

#### Adding Single Columns by Pairs

Take pairs of successive numbers at a time. *Add from the bottom up.*

1. \$5759.37	2. \$7856.21	3. \$6525.49
2186.62	2477.50	5214.44
4491.67	5843.84	8788.76
3848.60	3993.36	1115.81
6874.79	4751.85	2740.32
1831.04	9213.53	4569.82
1080.33	3363.26	9528.30
6461.73	9994.90	7271.70
<u>9823.34</u>	<u>9617.89</u>	<u>8983.55</u>

4. \$4142.97	5. \$6675.01	6. \$1916.46
4629.22	3508.07	2009.03
2089.83	5624.21	6538.82
9766.48	6039.10	8788.80
3367.72	7677.25	7531.01
9849.04	6393.03	8635.19
1623.26	6257.59	5096.58
4308.52	3646.51	1185.13
5354.34	9678.28	1714.55
4244.07	7170.27	4015.81
6874.79	3229.30	6422.37
<u>6118.91</u>	<u>4569.73</u>	<u>9947.94</u>

**Exercise No. 39****Mental Subtraction**

Use the method of making the subtrahend a round number. Subtract \$1 from the minuend and add to this the difference between \$1 and the given subtrahend.

Taking the first example: \$1 from \$5.18 leaves \$4.18; \$.83 from \$1 leaves \$.17;  $\$4.18 + \$.17 = \$4.35$ .

- |                    |                    |
|--------------------|--------------------|
| 1. \$5.18 - \$.83  | 11. \$3.22 - \$.93 |
| 2. \$6.42 - \$.83  | 12. \$7.37 - \$.61 |
| 3. \$1.89 - \$.95  | 13. \$4.56 - \$.97 |
| 4. \$2.47 - \$.99  | 14. \$6.87 - \$.91 |
| 5. \$7.48 - \$.56  | 15. \$2.21 - \$.65 |
| 6. \$8.29 - \$.66  | 16. \$4.86 - \$.97 |
| 7. \$3.18 - \$.87  | 17. \$3.32 - \$.64 |
| 8. \$7.27 - \$.43  | 18. \$7.75 - \$.83 |
| 9. \$4.19 - \$.49  | 19. \$4.12 - \$.63 |
| 10. \$3.53 - \$.77 | 20. \$6.23 - \$.26 |

**Exercise No. 40****Adding Single Columns by Trios**

Do the addition examples in Exercise No. 13 on page 11 by grouping three numbers at a time.

Taking the first example there presented, the following illustrates the method of adding: 13 (+12) 25, write 5 and carry 2; 2 (+17) 19, (+17) 36; answer, 365. Do not consciously repeat to yourself the individual amounts that you are adding, but only the successive total. *Add from the top down.*



## Exercise No. 41

## Adding Single Columns by Pairs

1. \$7489.99	2. \$8356.24	3. \$2165.38
2897.66	4860.39	1034.96
7828.17	8084.05	8788.86
3519.16	2303.32	2922.64
2237.61	1891.45	4142.44
7170.27	4015.94	9062.57
5950.95	5843.08	9849.04
1209.63	9326.73	4768.79
8152.92	3646.51	1185.13
5354.14	5520.33	6772.76
7725.75	3104.60	1348.37
6101.98	4953.91	6039.62
5429.30	6772.76	1780.84
4414.57	5910.18	9134.96
7812.07	7170.06	8788.86
5056.24	9564.22	7755.63
2593.26	2075.27	4033.03
<u>4569.35</u>	<u>9236.74</u>	<u>8932.58</u>

4. \$8799.55	5. \$1319.16	6. \$8348.84
4437.14	5781.63	2538.82
9793.08	5266.88	2861.41
4223.59	3926.73	9809.50
3218.94	9156.24	5834.43
9564.65	2227.49	5340.33
6296.78	1207.54	5446.31
4569.35	7729.30	5115.71
7006.68	6772.11	8521.65
7976.92	9036.17	8074.89
3612.97	8909.50	2124.56
8765.77	2930.51	1507.23
5960.54	9964.75	2279.76
5546.31	7188.86	2858.34
4347.04	4147.61	8085.37
9570.06	1457.10	4884.44
6935.05	3218.94	8168.39
<u>6774.27</u>	<u>4913.26</u>	<u>7273.93</u>

### Exercise No. 42

#### Mental Subtraction

Perform the subtractions in Exercise No. 39 by using the method of making a round number of the minuend. That is, reduce the minuend to the next lower number of even dollars. Subtract the subtrahend from this and then add the excess of cents in the minuend.

Taking the first example (\$5.18 - \$.83): \$.83 from \$5 leaves \$4.17; \$4.17 + 18 = \$4.35.

**Exercise No. 43****Mental Subtraction**

Perform the following subtractions mentally. Raise the subtrahend to the next larger number of even dollars.

- |                     |                     |
|---------------------|---------------------|
| 1. \$2.79 — \$1.86  | 11. \$5.53 — \$3.64 |
| 2. \$3.17 — \$1.97  | 12. \$2.62 — \$1.89 |
| 3. \$9.50 — \$6.69  | 13. \$3.05 — \$1.82 |
| 4. \$2.56 — \$1.91  | 14. \$8.28 — \$6.65 |
| 5. \$4.77 — \$2.81  | 15. \$8.10 — \$6.39 |
| 6. \$9.78 — \$3.94  | 16. \$5.15 — \$2.67 |
| 7. \$7.44 — \$4.49  | 17. \$4.47 — \$2.61 |
| 8. \$4.37 — \$2.72  | 18. \$7.93 — \$5.99 |
| 9. \$5.22 — \$2.98  | 19. \$5.40 — \$2.95 |
| 10. \$6.04 — \$5.33 | 20. \$3.23 — \$1.60 |

**Exercise No. 44****Mental Subtraction**

Do the examples in Exercise No. 43 by lowering the minuend to the next smaller number of even dollars.

## MULTIPLICATION IN GENERAL

Multiplication is the heart's core of the art of calculation. In itself it constitutes an art about which a large volume might be written.

The multiplication exercises in this book have three main objects in view—first, to enable the student to use all numbers up to 25 as direct multipliers in written work; second, to teach him to multiply mentally any number up to 1000 by any other number up to 1000; third, to drill him in various short-cut methods that apply to particular cases.

The use of numbers up to 25 as direct multipliers may be illustrated by this example:

A	B
7648	7648
1923	1923
<hr/>	<hr/>
22944	175904
15296	145312
68832	<hr/>
7648	14707104
<hr/>	
14707104	

In Method A, which is here shown for comparison, the usual procedure is followed. In Method B the calculation is performed thus:  $8 \times 23 = 184$ , write 4 and carry 18;  $4 \times 23 = 92$ ,  $92 + 18 = 110$ , write 0 and carry 11;  $6 \times 23 = 138$ ,  $138 + 11 = 149$ , write 9 and carry 14;  $7 \times 23 = 161$ ,  $161 + 14 = 175$ . Multiplication by 19 is done in the same way, and the partial products added.

To multiply in the manner described it is of course necessary to acquire a knowledge of the multiplication table up to  $25 \times 25$ . Instruction in this direction is given by very easy steps. There are several types of exercises leading to the same end.

Exercises in mental multiplication are similarly graded. You start by multiplying two figures by one, then two by two, then three by one, three by two, and finally three by three.

The subject of short cuts is highly specialized and need not detain us for the present.

#### **Exercise No. 45**

##### **Mental Multiplication**

Multiply by 2 the numbers in Table I on page 7. Proceed from left to right. A few examples of the method calculating will suffice.

$$32 \times 2: 30 \times 2 = 60, 2 \times 2 = 4, 60 + 4 = 64$$

$$45 \times 2: 40 \times 2 = 80, 5 \times 2 = 10, 80 + 10 = 90$$

$$49 \times 2: 40 \times 2 = 80, 9 \times 2 = 18, 80 + 18 = 98$$

$$99 \times 2: 90 \times 2 = 180, 9 \times 2 = 18, 180 + 18 = 198$$

#### **Exercise No. 46**

##### **Mental Multiplication**

Multiply mentally by 3 the numbers in Table I on page 7.

#### **Exercise No. 47**

##### **Mental Multiplication**

Multiply mentally by 4 the numbers in Table I on page 7.

## Exercise No. 48

### Adding Single Columns by Pairs

Take pairs of successive numbers at a time. *Add from the bottom up.*

1. \$227976.55

491368.39

476170.02

804501.33

920950.63

512573.15

2. \$364631.71

291241.97

620314.57

378990.83

267278.30

586721.69

3. \$693505.74

822427.23

186620.98

871060.54

118577.94

996475.17

4. \$430413.93

525632.59

198886.28

651653.40

964295.81

480444.80

5. \$605465.38

599320.95

810064.74

112279.76

431275.17

890890.55

6. \$694235.68

483929.91

841653.40

344518.66

624133.37

364698.97

**Exercise No. 49****Mental Subtraction**

Raise the subtrahend to the next larger number of even dollars.

- |                    |                     |
|--------------------|---------------------|
| 1. \$19.03 — \$.50 | 9. \$61.70 — \$.94  |
| 2. \$26.52 — \$.86 | 10. \$72.04 — \$.85 |
| 3. \$24.27 — \$.32 | 11. \$67.30 — \$.73 |
| 4. \$15.58 — \$.80 | 12. \$60.54 — \$.69 |
| 5. \$42.35 — \$.59 | 13. \$94.20 — \$.48 |
| 6. \$39.29 — \$.91 | 14. \$81.64 — \$.74 |
| 7. \$16.53 — \$.79 | 15. \$76.34 — \$.66 |
| 8. \$43.12 — \$.17 | 16. \$62.41 — \$.89 |

**Exercise No. 50****Mental Multiplication**

Multiply mentally by 5 the numbers in Table I on page 7.

**Exercise No. 51****Mental Subtraction**

Do the examples in Exercise No. 49 by reducing the minuend to the next smaller number of even dollars.

**Exercise No. 52****Mental Multiplication**

Multiply mentally by 6 the numbers in Table I on page 7.

**Exercise No. 53****Mental Multiplication**

Multiply mentally by 7 the numbers in Table I on page 7.

## Exercise No. 54

## Adding Single Columns by Pairs

Take pairs of successive numbers at a time. *Add from the top down.*

1. \$806054.65

681097.85

451866.93

431248.39

298291.24

322157.61

700177.25

714913.58

746789.23

569055.36

534011.98

281472.87

2. \$386942.35

933492.59

209507.09

751706.02

882750.78

305181.62

733115.33

379499.64

663265.52

444684.16

227976.86

377730.32

3. \$243130.39

158010.21

519794.95

893672.07

870485.02

834913.40

287919.76

697537.73

225942.35

435756.84

996168.05

164864.14

4. \$559663.93

882067.60

265254.65

332750.44

380353.71

462925.62

583492.78

411711.98

230882.09

911270.45

180190.66

744732.86



**Exercise No. 55****Mental Subtraction**

Raise the subtrahend to the next larger number of even dollars.

- |                     |                      |
|---------------------|----------------------|
| 1. \$24.31 — \$4.55 | 9. \$96.15 — \$8.88  |
| 2. \$26.36 — \$7.50 | 10. \$87.04 — \$2.53 |
| 3. \$49.13 — \$4.62 | 11. \$79.19 — \$7.58 |
| 4. \$34.37 — \$7.98 | 12. \$59.42 — \$3.82 |
| 5. \$43.12 — \$1.70 | 13. \$99.05 — \$1.90 |
| 6. \$14.06 — \$7.86 | 14. \$77.24 — \$3.55 |
| 7. \$15.10 — \$2.88 | 15. \$67.60 — \$5.97 |
| 8. \$26.52 — \$6.89 | 16. \$72.07 — \$3.87 |

**Exercise No. 56****Mental Multiplication**

Multiply mentally by 8 the numbers in Table I on page 7.

**Exercise No. 57****Adding Single Columns by Trios**

Do the examples in Exercise No. 15 on page 12 by taking three successive numbers at a time. *Add from the top down.*

**Exercise No. 58****Mental Subtraction**

Do the examples in Exercise No. 55 by lowering the minuend to the next smaller number of even dollars.

**Exercise No. 59****Addition of Partial Products**

The type of exercise here presented has a bearing on mental multiplication. Thus the first example represents, in inverted position, the partial products we get when we multiply 15 by 53.

$$\begin{array}{r}
 15 \\
 53 \\
 \hline
 45 \\
 750 \\
 \hline
 795
 \end{array}$$

When partial products of this kind occur in mental multiplication you are of necessity compelled *to retain them in your mind*. Hence to develop your ability to do this kind of memory work, you are asked to read each example once and then write it three times on paper before you perform the mental addition.

Complete the mental addition before writing the answer. Work from left to right. Thus in doing the first example you would say to yourself: 750, 790, 795. In doing the second you would say: 620, 680, 682.

1. $\begin{array}{r} 750 \\ 45 \\ \hline \end{array}$	2. $\begin{array}{r} 620 \\ 62 \\ \hline \end{array}$	3. $\begin{array}{r} 470 \\ 94 \\ \hline \end{array}$	4. $\begin{array}{r} 740 \\ 74 \\ \hline \end{array}$	5. $\begin{array}{r} 520 \\ 78 \\ \hline \end{array}$
6. $\begin{array}{r} 880 \\ 44 \\ \hline \end{array}$	7. $\begin{array}{r} 720 \\ 90 \\ \hline \end{array}$	8. $\begin{array}{r} 880 \\ 66 \\ \hline \end{array}$	9. $\begin{array}{r} 960 \\ 72 \\ \hline \end{array}$	10. $\begin{array}{r} 840 \\ 72 \\ \hline \end{array}$
11. $\begin{array}{r} 850 \\ 51 \\ \hline \end{array}$	12. $\begin{array}{r} 540 \\ 81 \\ \hline \end{array}$	13. $\begin{array}{r} 570 \\ 95 \\ \hline \end{array}$	14. $\begin{array}{r} 220 \\ 88 \\ \hline \end{array}$	15. $\begin{array}{r} 910 \\ 52 \\ \hline \end{array}$
16. $\begin{array}{r} 680 \\ 34 \\ \hline \end{array}$	17. $\begin{array}{r} 980 \\ 28 \\ \hline \end{array}$	18. $\begin{array}{r} 280 \\ 84 \\ \hline \end{array}$	19. $\begin{array}{r} 640 \\ 96 \\ \hline \end{array}$	20. $\begin{array}{r} 690 \\ 92 \\ \hline \end{array}$
21. $\begin{array}{r} 760 \\ 95 \\ \hline \end{array}$	22. $\begin{array}{r} 810 \\ 54 \\ \hline \end{array}$	23. $\begin{array}{r} 750 \\ 15 \\ \hline \end{array}$	24. $\begin{array}{r} 910 \\ 78 \\ \hline \end{array}$	25. $\begin{array}{r} 580 \\ 87 \\ \hline \end{array}$

### Exercise No. 60

#### Mental Multiplication

Multiply mentally by 9 the numbers in Table I on page 7.

**Exercise No. 61****Mental Multiplication**

Multiply mentally by 11 the numbers in Table I.

**Exercise No. 62****Adding Single Columns by Pairs**

*Add from the bottom up.*

<b>1. \$698504.99</b>	<b>2. \$457012.91</b>
845643.09	820823.58
761979.28	622529.46
401349.83	715303.47
740614.80	159363.96
553930.31	380272.36
896554.52	268195.94
975160.67	789234.17
417337.75	773286.20
882110.35	425922.98
116448.16	669001.18
477406.66	502733.07
801415.93	906396.55
340939.01	301831.05
380272.36	820889.23
656958.68	548620.61
882152.17	874185.10
<u>401304.99</u>	<u>761944.26</u>

3. \$662533.75  
 380277.80  
 847236.82  
 735356.57  
 236569.58  
 862061.88  
 178735.81  
 464385.34  
 425919.44  
 789249.94  
 395497.48  
 194426.67  
 129066.25  
 464347.56  
 316085.34  
 499498.27  
 776980.14  
518437.35

4. \$473105.74  
 141593.51  
 111290.63  
 897350.27  
 379128.68  
 966221.52  
 644107.29  
 104004.99  
 266722.95  
 987983.35  
 183216.70  
 295788.92  
 336353.75  
 578389.73  
 740638.09  
 236540.02  
 159383.58  
729128.36

## Exercise No. 63

### Mental Subtraction

Raise the subtrahend to the next larger number of even dollars.

1. \$83.37 — \$35.72
2. \$68.20 — \$61.99
3. \$97.48 — \$17.87
4. \$64.41 — \$29.67
9. \$91.28 — \$36.82
10. \$76.42 — \$62.59
11. \$55.30 — \$18.81
12. \$95.12 — \$90.66

5. \$25.33 — \$10.65
6. \$79.58 — \$51.84
7. \$48.54 — \$20.61
8. \$52.17 — \$30.32
13. \$65.40 — \$14.93
14. \$37.35 — \$28.82
15. \$49.01 — \$21.85
16. \$81.03 — \$41.16

**Exercise No. 64****Continuous Addition Drill**

Count by 3's to 75.

Count by 4's to 100.

Count by 6's to 150.

Count by 7's to 175.

Count by 8's to 200.

Count by 9's to 225.

Count by 11's to 275.

Count by 12's to 300.

Repeat this exercise three times.

**Exercise No. 65****Mental Subtraction**

Do the examples in Exercise No. 63 by lowering the minuend to the next smaller number of even dollars.

**Exercise No. 66****Mental Addition**

Read each of these examples once, write it three times and then add it mentally from left to right.

Be careful to think of the upper number in each case as something in the thousands and not as so many hundreds. Thus in the first example the upper number should be called one thousand seven hundred forty, *not* seventeen hundred forty. It is easier to think of comparatively small numbers as hundreds rather than as thousands plus hundreds, but this method of naming leads to trouble when dealing with larger numbers, and it is best to follow one uniform system.

$$\begin{array}{r} 1. \ 1740 \\ \quad 87 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \ 1650 \\ \quad 55 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \ 1080 \\ \quad 90 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \ 1280 \\ \quad 96 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \ 2430 \\ \quad 81 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \ 2560 \\ \quad 64 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \ 3690 \\ \quad 82 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \ 1120 \\ \quad 80 \\ \hline \end{array}$$

9. 1450 <u>87</u>	10. 1140 <u>95</u>	11. 1320 <u>88</u>	12. 1350 <u>78</u>
13. 1340 <u>67</u>	14. 1320 <u>88</u>	15. 1920 <u>96</u>	16. 2340 <u>78</u>
17. 3680 <u>92</u>	18. 1080 <u>84</u>	19. 1950 <u>65</u>	20. 2520 <u>72</u>

### Exercise No. 67

#### Mental Subtraction

Raise the subtrahend to the next larger number of even dollars.

- |                      |                       |
|----------------------|-----------------------|
| 1. \$855.30 — \$8.32 | 9. \$426.22 — \$7.78  |
| 2. \$844.16 — \$7.29 | 10. \$912.25 — \$5.33 |
| 3. \$671.46 — \$4.47 | 11. \$453.31 — \$5.60 |
| 4. \$834.06 — \$4.09 | 12. \$594.10 — \$7.23 |
| 5. \$642.02 — \$7.80 | 13. \$415.37 — \$7.91 |
| 6. \$836.11 — \$8.68 | 14. \$520.39 — \$9.76 |
| 7. \$862.21 — \$4.45 | 15. \$542.17 — \$8.55 |
| 8. \$532.13 — \$4.41 | 16. \$673.29 — \$9.44 |

### Exercise No. 68

#### Adding Single Columns by Trios

Do the examples in Exercise No. 17 on page 15 by grouping three successive numbers at a time. *Add from the top down.*

### Exercise No. 69

#### Mental Subtraction

Do the examples in Exercise No. 67 by reducing the minuend to the next smaller number of even dollars.

Table II

## Numbers for Multiplication Table Drill

A	B	C	D	E	F	G	H	J	K	L	M
2	2	2	2	2	2	2	2	2	2	2	2
4	5	6	7	8	9	10	11	8	9	10	11
6	8	10	12	14	16	18	20	14	16	18	20
8	11	14	17	3	3	3	3	20	23	3	3
10	14	3	3	9	10	11	12	13	3	11	12
12	3	7	8	15	17	19	21	9	10	19	21
14	6	11	13	4	4	4	4	15	17	4	4
3	9	15	4	10	11	12	13	21	4	12	13
5	12	4	9	16	18	20	5	4	11	20	22
7	15	8	14	5	5	5	14	10	18	5	5
9	4	12	5	11	12	13	6	16	5	13	14
11	7	16	10	17	19	6	15	22	12	21	23
13	10	5	15	6	6	14	7	5	19	6	6
	13	9	6	12	13	7	16	11	6	14	15
		13	11	18	7	15	8	17	13	22	24
			16	7	14	8	17	6	20	7	7
				13	8	16	9	12	7	15	16
					15	9	18	18	14	23	25
						17	10	7	21	8	8
							19	13	8	16	17
								19	15	24	9
									22	9	18
										17	10
											19

## Exercise No. 70

## Multiplication Table Drill

Use Table II on this page. Multiply the numbers in Column A successively by 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12. Repeat this exercise three times.

**Exercise No. 71****Mental Subtraction**

Raise the subtrahend to the next larger number of even dollars, and raise this amount in turn to an even \$100. Thus, taking the first example: \$100 from \$365.42 leaves \$265.42;  $\$265.42 + \$11$  (difference between \$100 and \$89) equals \$276.42;  $\$276.42 + \$.27 = \$276.69$ .

- |                       |                        |
|-----------------------|------------------------|
| 1. \$365.42 - \$88.73 | 9. \$459.48 - \$87.55  |
| 2. \$950.49 - \$94.98 | 10. \$553.18 - \$81.64 |
| 3. \$723.67 - \$40.77 | 11. \$416.07 - \$29.19 |
| 4. \$614.15 - \$93.79 | 12. \$426.22 - \$95.78 |
| 5. \$858.51 - \$84.72 | 13. \$912.25 - \$33.63 |
| 6. \$928.36 - \$36.82 | 14. \$753.46 - \$56.57 |
| 7. \$413.54 - \$86.61 | 15. \$831.05 - \$60.85 |
| 8. \$342.21 - \$96.62 | 16. \$743.16 - \$68.29 |

**Exercise No. 72****Adding Single Columns by Trios**

Do the examples in Exercise No. 22 on page 20 by grouping three successive numbers at a time. *Add from the bottom up.*

**Table III****Numbers to Be Multiplied**

- |           |            |            |
|-----------|------------|------------|
| 1. 111315 | 6. 171922  | 11. 222572 |
| 2. 111417 | 7. 182123  | 12. 541418 |
| 3. 121416 | 8. 897254  | 13. 192389 |
| 4. 121518 | 9. 248963  | 14. 151924 |
| 5. 541316 | 10. 258163 | 15. 212481 |



**Exercise No. 73****Written Multiplication**

Multiply the numbers in Table III by 6789.

**Exercise No. 74****Mental Addition**

Read each of the following examples once, write it three times and then add it mentally from left to right.

Think of the upper number in each case as being in the thousands and not the hundreds.

The first example would be added: 1280, 1480, 1536. In other words, take the first number as a whole, and then add to it successively the hundreds, tens and units of the second number.

$$\begin{array}{r} 1. \ 1280 \\ \quad 256 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \ 4410 \\ \quad 196 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \ 1960 \\ \quad 686 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \ 1380 \\ \quad 115 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \ 4620 \\ \quad 693 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \ 3060 \\ \quad 170 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \ 6510 \\ \quad 837 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \ 4150 \\ \quad 664 \\ \hline \end{array}$$

$$\begin{array}{r} 9. \ 4080 \\ \quad 204 \\ \hline \end{array}$$

$$\begin{array}{r} 10. \ 1110 \\ \quad 185 \\ \hline \end{array}$$

$$\begin{array}{r} 11. \ 6480 \\ \quad 144 \\ \hline \end{array}$$

$$\begin{array}{r} 12. \ 1450 \\ \quad 174 \\ \hline \end{array}$$

$$\begin{array}{r} 13. \ 1640 \\ \quad 246 \\ \hline \end{array}$$

$$\begin{array}{r} 14. \ 3350 \\ \quad 268 \\ \hline \end{array}$$

$$\begin{array}{r} 15. \ 5150 \\ \quad 344 \\ \hline \end{array}$$

$$\begin{array}{r} 16. \ 3510 \\ \quad 351 \\ \hline \end{array}$$

$$\begin{array}{r} 17. \ 3040 \\ \quad 304 \\ \hline \end{array}$$

$$\begin{array}{r} 18. \ 8080 \\ \quad 528 \\ \hline \end{array}$$

$$\begin{array}{r} 19. \ 1240 \\ \quad 372 \\ \hline \end{array}$$

$$\begin{array}{r} 20. \ 2250 \\ \quad 405 \\ \hline \end{array}$$

## Exercise No. 75

### Mental Subtraction

Do the examples in Exercise No. 71 on page 49 by lowering the minuend. Reduce it to the next smaller number of even dollars. Taking the first example:  $\$300 - \$88.73$  leaves  $\$211.27$ ;  $\$211.27 + \$65 = \$276.27$ ;  $\$276.27 + \$.42 = \$276.69$ .

## Exercise No. 76

### Adding Single Columns by Trios

Do the examples in Exercise No. 26 on page 23 by grouping three successive numbers at a time. *Add from the top down.*

## Exercise No. 77

### Mental Multiplication

Multiply mentally by 12 the numbers in Table I on page 7.

## Exercise No. 78

### Adding Single Columns by Trios

Do the examples in Exercise No. 34 on page 28 by grouping three successive numbers at a time.

## Exercise No. 79

### Mental Subtraction

Raise the subtrahend to the next larger number of even hundreds of dollars.

- |                          |                          |
|--------------------------|--------------------------|
| 1. $\$950.49 - \$498.65$ | 5. $\$769.14 - \$580.93$ |
| 2. $\$646.43 - \$456.57$ | 6. $\$831.05 - \$685.34$ |
| 3. $\$520.39 - \$176.42$ | 7. $\$821.45 - \$529.48$ |
| 4. $\$821.13 - \$468.54$ | 8. $\$862.39 - \$197.76$ |

- |                         |                         |
|-------------------------|-------------------------|
| 9. \$318.32 — \$181.64  | 13. \$416.07 — \$219.44 |
| 10. \$636.09 — \$549.95 | 14. \$640.02 — \$493.79 |
| 11. \$714.10 — \$273.65 | 15. \$746.14 — \$159.93 |
| 12. \$821.45 — \$599.97 | 16. \$752.30 — \$183.81 |

**Exercise No. 80****Mental Addition**

Read each of the following examples once, write it three times and then add it mentally from left to right. The first example would be added: 16530, 17030, 17081.

- |                         |                         |                         |
|-------------------------|-------------------------|-------------------------|
| 1. 16530<br><u>551</u>  | 2. 12930<br><u>431</u>  | 3. 24920<br><u>623</u>  |
| 4. 22080<br><u>552</u>  | 5. 37150<br><u>743</u>  | 6. 33650<br><u>673</u>  |
| 7. 51780<br><u>863</u>  | 8. 44460<br><u>741</u>  | 9. 67340<br><u>962</u>  |
| 10. 61810<br><u>883</u> | 11. 19360<br><u>242</u> | 12. 12160<br><u>152</u> |
| 13. 76960<br><u>962</u> | 14. 32670<br><u>363</u> | 15. 25380<br><u>282</u> |
| 16. 12690<br><u>141</u> | 17. 15320<br><u>766</u> | 18. 19620<br><u>654</u> |
| 19. 21720<br><u>543</u> | 20. 46650<br><u>933</u> | 21. 44160<br><u>736</u> |

**Exercise No. 81****Written Multiplication**

Multiply by 1112 each of the numbers in Table III on page 49. Wherever there occurs in the multiplicand a pair of figures that may be considered as 11 or 12, make one multiplication of this instead of two, and accordingly write down two figures in the partial product. Taking the first example:

$$\begin{array}{r}
 111315 \\
 \underline{1112} \\
 1335780 \\
 \underline{1224465} \\
 123782280
 \end{array}$$

111315 is successively multiplied (from right to left) by 12 and 11 thus:  $5 \times 12 = 60$ , write 0 and carry 6;  $1 \times 12 = 12$ ,  $12 + 6 = 18$ , write 8 and carry 1;  $3 \times 12 = 36$ ,  $36 + 1 = 37$ , write 7 and carry 3;  $11 \times 12 = 132$ ,  $132 + 3 = 135$ , write 35 and carry 1;  $1 \times 12 = 12$ ,  $12 + 1 = 13$ , write 13. Multiplication by 11 is carried out in the same way.

In doing these examples be watchful about placing the second partial product *two* places to the left of the first.

**Exercise No. 82****Adding Single Columns by Trios**

Do the examples in Exercise No. 38 on page 32 by grouping three successive numbers at a time. *Add from the bottom up.*

**Exercise No. 83****Mental Subtraction**

Do the examples in Exercise No. 79 on page 51 by lowering the minuend to the next smaller number of even hundreds of dollars.

## Exercise No. 84

## Mental Addition

Read each of the following examples once, write it three times and then add it mentally from left to right.

Add in turn the thousands, hundreds, tens and units to the upper number. In doing the first example you should say to yourself something like the following:  $18360 + 1224$ ,  $19360$ ;  $19360 + 224$ ,  $19560$ ;  $19560 + 24$ ,  $19584$ .

$$\begin{array}{r} 1. \ 18360 \\ \quad 1224 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \ 21630 \\ \quad 2163 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \ 24960 \\ \quad 3328 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \ 18820 \\ \quad 5646 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \ 16260 \\ \quad 1084 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \ 19530 \\ \quad 1953 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \ 21360 \\ \quad 2848 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \ 16420 \\ \quad 4926 \\ \hline \end{array}$$

$$\begin{array}{r} 9. \ 18640 \\ \quad 6524 \\ \hline \end{array}$$

$$\begin{array}{r} 10. \ 10290 \\ \quad 2401 \\ \hline \end{array}$$

$$\begin{array}{r} 11. \ 13530 \\ \quad 3608 \\ \hline \end{array}$$

$$\begin{array}{r} 12. \ 16860 \\ \quad 5058 \\ \hline \end{array}$$

$$\begin{array}{r} 13. \ 29240 \\ \quad 1462 \\ \hline \end{array}$$

$$\begin{array}{r} 14. \ 33680 \\ \quad 2526 \\ \hline \end{array}$$

$$\begin{array}{r} 15. \ 28590 \\ \quad 4765 \\ \hline \end{array}$$

$$\begin{array}{r} 16. \ 13230 \\ \quad 3969 \\ \hline \end{array}$$

$$\begin{array}{r} 17. \ 26520 \\ \quad 1326 \\ \hline \end{array}$$

$$\begin{array}{r} 18. \ 28840 \\ \quad 2163 \\ \hline \end{array}$$

$$\begin{array}{r} 19. \ 24960 \\ \quad 4160 \\ \hline \end{array}$$

$$\begin{array}{r} 20. \ 28290 \\ \quad 5658 \\ \hline \end{array}$$

$$\begin{array}{r} 21. \ 14120 \\ \quad 2118 \\ \hline \end{array}$$

## Exercise No. 85

## Continuous Addition Drill

Count by 4's to 100.

Count by 6's to 150.

Count by 7's to 175.

Count by 8's to 200.

Count by 9's to 225.

Count by 11's to 275.

Count by 12's to 300.

Count by 13's to 325.

Repeat this exercise three times.

## Exercise No. 86

## Adding Single Columns by Trios

Do the examples in Exercise No. 41 on page 34 by grouping three successive numbers at a time. *Add from the top down.*

## Exercise No. 87

## Factoring

When numbers are multiplied together, they are considered *factors* of the resulting *product*. Thus 2 and 3 are factors of 6, and 3 and 5 are factors of 15.

*Factoring* a number is the process of resolving the number into the factors that will produce the number when multiplied together. Thus 36 may be factored as  $2 \times 18$ , or as  $3 \times 12$ , or as  $4 \times 9$ , or as  $6 \times 6$ .\*

Any number that can be resolved into factors is called a *composite* number.

A *prime* number is one that has no factors besides itself and 1. Thus, 1, 2, 3, 5, 7, 11, 13, etc. are prime numbers.

\* If it were required to give the *prime* factors of 36, these would be  $2 \times 2 \times 3 \times 3$ , but factoring into prime numbers has nothing to do with the purposes of this book.

On the pages starting with 146 will be found a table which analyzes all prime and composite numbers up to 625. You will be taught gradually to familiarize yourself with this entire table. The purpose of this is to help you to recognize quickly the character of these numbers—to enable you to multiply rapidly the factors that produce any of them, or to separate any of them into such factors.

Of special importance in this table are the numbers printed in italic type, since these can be produced by two factors each of which is 25 or less.

It is quite commonly appreciated that very small numbers have a definite individuality which grows out of the many associations built up around them in our minds. The individual character of higher numbers becomes similarly apparent and unforgettable when we single them out for particular attention.

For the first exercise in factoring read the first two columns of the table on page 146, and then write these from memory (or calculation) in the same form.

In studying the table note that each composite number is factored by first taking the smaller factors in the order of their size, and that the combinations are not repeated. Thus the separate ways of factoring 48 are given as  $2 \times 24$ ,  $3 \times 16$ ,  $4 \times 12$  and  $6 \times 8$ . These combinations are not repeated as  $8 \times 6$ ,  $12 \times 4$ ,  $16 \times 3$ , and  $24 \times 2$ .

### Exercise No. 88

#### Multiplication Table Drill

Use Table II on page 48.

Multiply the numbers in Column A successively by 3, 4, 6, 7, 8, 9, 11, 12 and 13.

Repeat this exercise three times.

This exercise takes us the first step beyond the custom-

ary limits of the multiplication table, which ordinarily goes no farther than  $12 \times 12$ . Succeeding examples will enable you to memorize the products of all pairs of numbers up to  $25 \times 25$ .

No multiplication table, as such, is presented in this book, because learning the products of higher factors by sheer power of memory is extremely difficult. On the other hand, when you are put over and over again to the necessity of figuring out these higher combinations for yourself, they soon come to stick firmly in the mind.

### Exercise No. 89

#### Mental Addition

Read each of the following examples once, write it three times, and then add it mentally from left to right. The first example would be added: 165300, 170300, 170810.

$$\begin{array}{r} 1. \ 165300 \\ \quad 5510 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \ 129300 \\ \quad 4310 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \ 249200 \\ \quad 6230 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \ 220800 \\ \quad 5520 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \ 371500 \\ \quad 7430 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \ 336500 \\ \quad 6730 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \ 517800 \\ \quad 8630 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \ 444600 \\ \quad 7410 \\ \hline \end{array}$$

$$\begin{array}{r} 9. \ 673400 \\ \quad 9620 \\ \hline \end{array}$$

$$\begin{array}{r} 10. \ 618100 \\ \quad 8830 \\ \hline \end{array}$$

$$\begin{array}{r} 11. \ 193600 \\ \quad 2420 \\ \hline \end{array}$$

$$\begin{array}{r} 12. \ 121600 \\ \quad 1520 \\ \hline \end{array}$$

$$\begin{array}{r} 13. \ 769600 \\ \quad 9620 \\ \hline \end{array}$$

$$\begin{array}{r} 14. \ 326700 \\ \quad 3630 \\ \hline \end{array}$$

$$\begin{array}{r} 15. \ 253800 \\ \quad 2820 \\ \hline \end{array}$$



$$\begin{array}{r} 16. \ 126900 \\ \quad 1410 \\ \hline \end{array}$$

$$\begin{array}{r} 17. \ 153200 \\ \quad 7660 \\ \hline \end{array}$$

$$\begin{array}{r} 18. \ 196200 \\ \quad 6540 \\ \hline \end{array}$$

$$\begin{array}{r} 19. \ 217200 \\ \quad 5430 \\ \hline \end{array}$$

$$\begin{array}{r} 20. \ 456500 \\ \quad 9330 \\ \hline \end{array}$$

$$\begin{array}{r} 21. \ 441600 \\ \quad 7360 \\ \hline \end{array}$$

**Exercise No. 90****Mental Multiplication**

Multiply mentally by 13 the numbers in Table I on page 7.

In working with numbers from 80 upward, immediately name 1000 as the first part of the product. Thus  $83 \times 13$  is 1040, (+39) 1079;  $97 \times 13$  is 1170, 1261.

**Exercise No. 91****Adding Single Columns by Trios**

Do the examples in Exercise No. 48 on page 39 by grouping three successive numbers at a time. *Add from the bottom up.*

**Exercise No. 92****Factoring**

Read the table on page 146 from 31 to 72 inclusive, and then write it in the same form.

**Exercise No. 93****Mental Addition**

Read each of the following examples once, write it three times and then add it mentally from left to right.

Add in turn the tens of thousands, thousands, hundreds and tens to the upper number. The first example would be added: 183600, 193600, 195600, 195840.

$$\begin{array}{r} 1. \ 183600 \\ \underline{12240} \end{array}$$

$$\begin{array}{r} 2. \ 216300 \\ \underline{21630} \end{array}$$

$$\begin{array}{r} 3. \ 249600 \\ \underline{33280} \end{array}$$

$$\begin{array}{r} 4. \ 188200 \\ \underline{56460} \end{array}$$

$$\begin{array}{r} 5. \ 162600 \\ \underline{10840} \end{array}$$

$$\begin{array}{r} 6. \ 195300 \\ \underline{19530} \end{array}$$

$$\begin{array}{r} 7. \ 213600 \\ \underline{28480} \end{array}$$

$$\begin{array}{r} 8. \ 164200 \\ \underline{49260} \end{array}$$

$$\begin{array}{r} 9. \ 186400 \\ \underline{65240} \end{array}$$

$$\begin{array}{r} 10. \ 102900 \\ \underline{24010} \end{array}$$

$$\begin{array}{r} 11. \ 135300 \\ \underline{36080} \end{array}$$

$$\begin{array}{r} 12. \ 168600 \\ \underline{50580} \end{array}$$

$$\begin{array}{r} 13. \ 292400 \\ \underline{14620} \end{array}$$

$$\begin{array}{r} 14. \ 336800 \\ \underline{25260} \end{array}$$

$$\begin{array}{r} 15. \ 285900 \\ \underline{47650} \end{array}$$

$$\begin{array}{r} 16. \ 132300 \\ \underline{39690} \end{array}$$

$$\begin{array}{r} 17. \ 265200 \\ \underline{13260} \end{array}$$

$$\begin{array}{r} 18. \ 288400 \\ \underline{21630} \end{array}$$

$$\begin{array}{r} 19. \ 249600 \\ \underline{41600} \end{array}$$

$$\begin{array}{r} 20. \ 282900 \\ \underline{56580} \end{array}$$

$$\begin{array}{r} 21. \ 141200 \\ \underline{21180} \end{array}$$

## Exercise No. 94

### Written Multiplication

Multiply by 1213 each of the numbers in Table III on page 49. Wherever there occurs in the multiplicand a pair of figures that may be considered as 11, 12 or 13, make one multiplication of this instead of two, and write two figures in the partial product. Thus, taking the first example, we successively multiply 15, 13 and 11 by 13 and again by 12. The partial products are accordingly written in two lines instead of the customary four.

**Exercise No. 95****Adding Single Columns by Trios**

Do the examples in Exercise No. 54 on page 41 by grouping three successive numbers at a time. *Add from the top down.*

**Exercise No. 96****Factoring**

Factor the numbers from 54 to 92 inclusive in the form shown in the table on page 146.

**Exercise No. 97****Mental Addition**

Read each of the following examples once, write it three times and then add it mentally from left to right.

Add the whole of the second number to the first before considering the third. Repeat to yourself several times the sum of the first and second if you find this necessary.

The third example would be added: 36300, 39300, 39930; (repeat 39930, 39930); 39930, 40030, 40051.

$$\begin{array}{r} 1. \ 10100 \\ \quad 1010 \\ \quad \underline{101} \end{array}$$

$$\begin{array}{r} 2. \ 22200 \\ \quad 2220 \\ \quad \underline{222} \end{array}$$

$$\begin{array}{r} 3. \ 36300 \\ \quad 3630 \\ \quad \underline{121} \end{array}$$

$$\begin{array}{r} 4. \ 52400 \\ \quad 5240 \\ \quad \underline{262} \end{array}$$

$$\begin{array}{r} 5. \ 70500 \\ \quad 7050 \\ \quad \underline{141} \end{array}$$

$$\begin{array}{r} 6. \ 90600 \\ \quad 1510 \\ \quad \underline{302} \end{array}$$

$$\begin{array}{r} 7. \ 19100 \\ \quad 9950 \\ \quad \underline{382} \end{array}$$

$$\begin{array}{r} 8. \ 20200 \\ \quad 1010 \\ \quad \underline{101} \end{array}$$

$$\begin{array}{r} 9. \ 33300 \\ \quad 2220 \\ \quad \underline{222} \end{array}$$

10. 48400 3630 <u>121</u>	11. 65500 5240 <u>262</u>	12. 84600 7050 <u>141</u>
13. 18100 7240 <u>181</u>	14. 38200 9050 <u>905</u>	15. 20200 4040 <u>202</u>
16. 42400 6360 <u>424</u>	17. 66600 8880 <u>666</u>	18. 40400 4040 <u>404</u>
19. 33600 3360 <u>336</u>	20. 88800 8880 <u>222</u>	21. 30300 9090 <u>303</u>

**Exercise No. 98****Continuous Addition Drill**

Count by 6's to 150.

Count by 7's to 175.

Count by 8's to 200.

Count by 9's to 225.

Count by 11's to 275.

Count by 12's to 300.

Count by 13's to 325.

Count by 14's to 350.

Repeat this exercise three times.

**Exercise No. 99****Adding Single Columns by Trios**

Do the examples in Exercise No. 62 on page 44 by grouping three successive numbers at a time. *Add from the bottom up.*

## Exercise No. 100

## Factoring

Factor the numbers from 73 to 111 inclusive in the form shown in the table on page 146.

## Exercise No. 101

## Mental Addition

Read each of the following examples once, write it three times and then add it mentally from left to right.

The first example would be added: 26200, 33200, 34000, 34060; 34060, 36060, 36156.

1. 26200

7860

2096

2. 48400

9680

1210

3. 69900

9320

1398

4. 12100

9680

1089

5. 26400

9240

1056

6. 42900

8580

1144

7. 61600

9240

1078

8. 82500

9900

1155

9. 88000

8800

1056

10. 93500

9350

1122

11. 98000

9800

1188

12. 73200

9760

1098

13. 93100

9310

1064

14. 97600

9760

1220

15. 71000

7100

1065

16. 46600

9320

1398

17. 57700

5770

2308

18. 68800

6880

2064

$$\begin{array}{r} 19. \ 79900 \\ \quad 7990 \\ \hline \quad 3196 \end{array}$$

$$\begin{array}{r} 20. \ 24600 \\ \quad 9840 \\ \hline \quad 1107 \end{array}$$

$$\begin{array}{r} 21. \ 70200 \\ \quad 9320 \\ \hline \quad 1170 \end{array}$$

### Exercise No. 102

#### Multiplication Table Drill

Use Table II on page 48.

Multiply the numbers in Column A successively by 4, 6, 7, 8, 9, 11, 12, 13 and 14.

Repeat this exercise three times.

### Exercise No. 103

#### Two-Column Addition

You are now ready to start adding two columns at a time. Take Exercise No. 13 on page 11. *Add from the top down.*

Two-column addition is simply an application of the left-to-right methods which you have already learned. To illustrate with the first example:

$$\begin{array}{r} 43 \\ 62 \\ 78 \\ 81 \\ 14 \\ \hline 87 \end{array}$$

This would be added: 43, 103, 105, 175, 183, 263, 264, 274, 278, 358, 365. These are the actual steps, but with practice you will read this as 105, 183, 264, 278, 365.

### Exercise No. 104

#### Factoring

Factor the numbers from 93 to 129 inclusive in the form shown in the table on pages 146 and 147.

## Exercise No. 105

## Mental Addition

Read each of the following examples once, write it three times, and then add it mentally from left to right.

$$\begin{array}{r} 1. \ 112700 \\ \quad 3220 \\ \quad \underline{161} \end{array}$$

$$\begin{array}{r} 2. \ 136800 \\ \quad 5130 \\ \quad \underline{342} \end{array}$$

$$\begin{array}{r} 3. \ 162900 \\ \quad 2400 \\ \quad \underline{181} \end{array}$$

$$\begin{array}{r} 4. \ 105700 \\ \quad 1510 \\ \quad \underline{302} \end{array}$$

$$\begin{array}{r} 5. \ 128800 \\ \quad 3220 \\ \quad \underline{161} \end{array}$$

$$\begin{array}{r} 6. \ 153900 \\ \quad 5130 \\ \quad \underline{342} \end{array}$$

$$\begin{array}{r} 7. \ 151200 \\ \quad 5040 \\ \quad \underline{756} \end{array}$$

$$\begin{array}{r} 8. \ 183400 \\ \quad 7860 \\ \quad \underline{262} \end{array}$$

$$\begin{array}{r} 9. \ 176400 \\ \quad 5040 \\ \quad \underline{252} \end{array}$$

$$\begin{array}{r} 10. \ 209600 \\ \quad 7860 \\ \quad \underline{524} \end{array}$$

$$\begin{array}{r} 11. \ 104800 \\ \quad 5240 \\ \quad \underline{524} \end{array}$$

$$\begin{array}{r} 12. \ 103200 \\ \quad 6880 \\ \quad \underline{860} \end{array}$$

$$\begin{array}{r} 13. \ 114100 \\ \quad 6520 \\ \quad \underline{978} \end{array}$$

$$\begin{array}{r} 14. \ 112800 \\ \quad 7050 \\ \quad \underline{423} \end{array}$$

$$\begin{array}{r} 15. \ 126000 \\ \quad 7560 \\ \quad \underline{756} \end{array}$$

$$\begin{array}{r} 16. \ 111000 \\ \quad 9250 \\ \quad \underline{740} \end{array}$$

$$\begin{array}{r} 17. \ 104400 \\ \quad 8700 \\ \quad \underline{870} \end{array}$$

$$\begin{array}{r} 18. \ 135900 \\ \quad 9060 \\ \quad \underline{302} \end{array}$$

$$\begin{array}{r} 19. \ 112800 \\ \quad 9870 \\ \quad \underline{141} \end{array}$$

$$\begin{array}{r} 20. \ 130500 \\ \quad 8700 \\ \quad \underline{435} \end{array}$$

$$\begin{array}{r} 21. \ 136800 \\ \quad 6800 \\ \quad \underline{684} \end{array}$$

## Exercise No. 106

### Mental Multiplication

Multiply mentally by 14 the numbers in Table I on page 7.

## Exercise No. 107

### Two-Column Addition

Do the examples in Exercise No. 17 on page 15 by adding two columns at a time. *Add from the bottom up.*

## Exercise No. 108

### Factoring

Factor the numbers from 112 to 145 inclusive in the form shown in the table on pages 146 and 147.

## Exercise No. 109

### Mental Addition

Read each of the following examples once, write it three times, and then add it mentally from left to right.

$$\begin{array}{r} 1. \ 121000 \\ \ 14520 \\ \ \underline{484} \end{array}$$

$$\begin{array}{r} 2. \ 217600 \\ \ 10880 \\ \ \underline{544} \end{array}$$

$$\begin{array}{r} 3. \ 253800 \\ \ 14100 \\ \ \underline{846} \end{array}$$

$$\begin{array}{r} 4. \ 116000 \\ \ 11600 \\ \ \underline{464} \end{array}$$

$$\begin{array}{r} 5. \ 145200 \\ \ 14520 \\ \ \underline{726} \end{array}$$

$$\begin{array}{r} 6. \ 224800 \\ \ 10880 \\ \ \underline{816} \end{array}$$

$$\begin{array}{r} 7. \ 171500 \\ \ 24010 \\ \ \underline{343} \end{array}$$

$$\begin{array}{r} 8. \ 211800 \\ \ 10590 \\ \ \underline{706} \end{array}$$

$$\begin{array}{r} 9. \ 344700 \\ \ 22980 \\ \ \underline{383} \end{array}$$

$$\begin{array}{r} 10. \ 129200 \\ \ 16150 \\ \ \underline{323} \end{array}$$

$$\begin{array}{r} 11. \ 166500 \\ \ 19980 \\ \ \underline{666} \end{array}$$

$$\begin{array}{r} 12. \ 290400 \\ \ 14520 \\ \ \underline{363} \end{array}$$



$$\begin{array}{r} 13. \ 335700 \\ \quad 18650 \\ \quad \underline{746} \end{array}$$

$$\begin{array}{r} 14. \ 272400 \\ \quad 18160 \\ \quad \underline{454} \end{array}$$

$$\begin{array}{r} 15. \ 324800 \\ \quad 23200 \\ \quad \underline{928} \end{array}$$

$$\begin{array}{r} 16. \ 124200 \\ \quad 20700 \\ \quad \underline{828} \end{array}$$

$$\begin{array}{r} 17. \ 317800 \\ \quad 18160 \\ \quad \underline{454} \end{array}$$

$$\begin{array}{r} 18. \ 371200 \\ \quad 23200 \\ \quad \underline{924} \end{array}$$

$$\begin{array}{r} 19. \ 395500 \\ \quad 34200 \\ \quad \underline{565} \end{array}$$

$$\begin{array}{r} 20. \ 210000 \\ \quad 36750 \\ \quad \underline{525} \end{array}$$

$$\begin{array}{r} 21. \ 540800 \\ \quad 33800 \\ \quad \underline{676} \end{array}$$

### Exercise No. 110

#### Written Multiplication

Multiply by 1314 the numbers in Table III on page 49.

### Exercise No. 111

#### Two-Column Addition

Do the examples in Exercise No. 26 on page 23 by adding two columns at a time. *Add from the top down.*

### Exercise No. 112

#### Factoring

Factor the numbers from 130 to 162 inclusive in the form shown in the table on page 147.

### Exercise No. 113

#### Mental Addition

Read each of the following examples once, write it three times, and then add it mentally from left to right.

$$\begin{array}{r} 1. \ 123200 \\ \quad 39800 \\ \quad \underline{1232} \end{array}$$

$$\begin{array}{r} 2. \ 187800 \\ \quad 37560 \\ \quad \underline{1878} \end{array}$$

$$\begin{array}{r} 3. \ 254400 \\ \quad 44520 \\ \quad \underline{2544} \end{array}$$

<b>4. 323000</b> 51680 <u>3230</u>	<b>5. 393600</b> 59040 <u>3936</u>	<b>6. 466200</b> 26640 <u>4662</u>
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<b>7. 616200</b> 41160 <u>1392</u>	<b>8. 121200</b> 48480 <u>2424</u>	<b>9. 184800</b> 55440 <u>3080</u>
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<b>10. 250400</b> 25040 <u>3956</u>	<b>11. 318000</b> 31800 <u>4452</u>	<b>12. 387600</b> 38760 <u>1292</u>
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<b>13. 439200</b> 43920 <u>1312</u>	<b>14. 532800</b> 53280 <u>1998</u>	<b>15. 608400</b> 60840 <u>2704</u>
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<b>16. 139200</b> 34800 <u>1392</u>	<b>17. 143400</b> 28680 <u>1434</u>	<b>18. 218700</b> 36350 <u>2187</u>
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<b>19. 294800</b> 44220 <u>2948</u>	<b>20. 373500</b> 52290 <u>3735</u>	<b>21. 454200</b> 60560 <u>4542</u>
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## Exercise No. 114

### Continuous Addition Drill

Count by 7's to 175.  
 Count by 8's to 200.  
 Count by 9's to 225.  
 Count by 11's to 275.  
 Count by 12's to 300.  
 Count by 13's to 325.

Count by 14's to 350.

Count by 15's to 375.

Repeat this exercise three times.

### Exercise No. 115

#### Two-Column Addition

Do the examples in Exercise No. 34 on page 28 by adding two columns at a time. *Add from the bottom up.*

### Exercise No. 116

#### Multiplication Table Drill

Use Table II on page 48.

Multiply the numbers in Column B successively by 6, 7, 8, 9, 11, 12, 13, 14 and 15.

Repeat this exercise three times.

### Exercise No. 117

#### Factoring

Factor the numbers from 146 to 179 inclusive in the form shown in the table on page 147.

### Exercise No. 118

#### Two-Column Addition

Do the examples in Exercise No. 38 on page 32 by adding two columns at a time. *Add from the top down.*

It slows up addition by two columns to keep repeating the number of hundreds as you go along. A good plan is to keep tally of the number of hundreds with a pencil. In all addition of long columns write numbers to be carried either at the head of the next column or beneath the figures in the total as you set them down. When looking for errors in addition, add in the opposite direction from that in which the addition was originally performed.

## Exercise No. 119

### Mental Multiplication

Multiply mentally by 15 the numbers in Table I on page 7.

## Exercise No. 120

### Two-Column Addition

Do the examples in Exercise No. 41 on page 34 by adding two columns at a time. *Add from the bottom up.*

## Exercise No. 121

### Factoring

Factor the numbers from 163 to 194 inclusive in the form shown in the table on page 147.

## Exercise No. 122

### Two-Column Addition

Do the examples in Exercise No. 48 on page 39 by adding two columns at a time. *Add from the top down.*

## Exercise No. 123

### Written Multiplication

Multiply by 1415 the numbers in Table III on page 49.

## Exercise No. 124

### Two-Column Addition

Do the examples in Exercise No. 54 on page 41 by adding two columns at a time. *Add from the bottom up.*

**Exercise No. 125****Factoring**

Factor the numbers from 180 to 209 inclusive in the form shown in the table on page 147.

**Exercise No. 126****Two-Column Addition**

Do the examples in Exercise No. 62 on page 44 by adding two columns at a time. *Add from the top down.*

**Exercise No. 127****Continuous Addition Drill**

Count by 8's to 200.

Count by 9's to 225.

Count by 11's to 275.

Count by 12's to 300.

Count by 13's to 325.

Count by 14's to 350.

Count by 15's to 375.

Count by 16's to 400.

Repeat this exercise three times.

**Exercise No. 128****Three-Column Addition**

With the practice you have had in two-column addition you should now be able to add three columns at a time. Try this with the examples in Exercise No. 38 on page 32. No additional exercises in three-column addition are given, but you can of course practice it on your own account if you so desire.

## Exercise No. 129

### Multiplication Table Drill

Use Table II on page 48.

Multiply the numbers in Column C successively by 7, 8, 9, 11, 12, 13, 14, 15 and 16.

Repeat this exercise three times.

## Exercise No. 130

### Factoring

Factor the numbers from 195 to 224 inclusive in the form shown in the table on pages 147 and 148.

## Exercise No. 131

### Mental Multiplication

Multiply mentally by 16 the numbers in Table I on page 7.

## Exercise No. 132

### Written Multiplication

Multiply by 1516 the numbers in Table III on page 49.

## Exercise No. 133

### Factoring

Factor the numbers from 210 to 239 inclusive in the form shown in the table on pages 147 and 148.

## DIVISION IN GENERAL

Division is multiplication in reverse. As you improve in multiplication you automatically develop your skill at division. For this reason it has been considered unnecessary to include any exercises in long division.

Exercises, however, are given in mental division, in order to round out your general calculating ability. These exercises are of the following types:

First you use the numbers from 2 to 25 as direct divisors, securing quotients from 1 to 99. Then you divide by the numbers from 2 to 9, finding answers of three places. Again, you divide by three-place numbers to arrive at quotients of one figure plus a remainder; the remainder is included so that the answer cannot be guessed but must be calculated accurately. Finally, you divide by numbers of two places and get results of two places. As division is somewhat more complicated, the exercises in division are not carried so far as those in multiplication.

### **Exercise No. 134**

#### **Mental Division**

Divide mentally by 2 the answers to Exercise No. 45 as given on pages 161 and 162. Compare your answers with Table I on page 7.

### **Exercise No. 135**

#### **Continuous Addition Drill**

Count by 9's to 225.

Count by 11's to 275.

Count by 12's to 300.

Count by 13's to 325.

Count by 14's to 350.

Count by 15's to 375.

Count by 16's to 400.

Count by 17's to 425.

Repeat this exercise three times.

### **Exercise No. 136**

#### **Mental Division**

Divide mentally by 3 the answers to Exercise No. 46 as given on page 162. Compare your answers with Table I on page 7.

### **Exercise No. 137**

#### **Multiplication Table Drill**

Use Table II on page 48.

Multiply mentally the numbers in Column D by 8, 9, 11, 12, 13, 14, 15, 16 and 17.

Repeat this exercise three times.

### **Exercise No. 138**

#### **Factoring**

Factor the numbers from 225 to 254 inclusive in the form shown in the table on page 148.

### **Exercise No. 139**

#### **Mental Division**

Divide mentally by 4 the answers to Exercise No. 47 as given on page 162. Compare your answers with Table I on page 7.

### **Exercise No. 140**

#### **Mental Multiplication**

Multiply mentally by 17 the numbers in Table I on page 7.



**Exercise No. 141****Written Multiplication**

Multiply by 1617 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 17.

**Exercise No. 142****Factoring**

Factor the numbers from 240 to 269 inclusive in the form shown in the Table on page 148.

**Exercise No. 143****Mental Division**

Divide mentally by 5 the answers to Exercise No. 50 as given on page 163. Compare your answers with Table I on page 7.

**Exercise No. 144****Continuous Addition Drill**

Count by 11's to 275.

Count by 12's to 300.

Count by 13's to 325.

Count by 14's to 350.

Count by 15's to 375.

Count by 16's to 400.

Count by 17's to 425.

Count by 18's to 450.

Repeat this exercise three times.

**Exercise No. 145****Multiplication Table Drill**

Use Table II on page 48.

Multiply mentally the numbers in Column E by 9, 11, 12, 13, 14, 15, 16, 17 and 18.

Repeat this exercise three times.

**Exercise No. 146****Factoring**

Factor the numbers from 255 to 284 inclusive in the form shown in the table on page 148.

**Exercise No. 147****Mental Division**

Divide mentally by 6 the answers to Exercise No. 52 as given on page 163. Compare your answers with Table I on page 7.

**Exercise No. 148****Mental Multiplication**

Multiply mentally by 18 the numbers in Table I on page 7.

**Exercise No. 149****Written Multiplication**

Multiply by 1718 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 18.

**Exercise No. 150****Factoring**

Factor the numbers from 270 to 299 inclusive in the form shown in the table on pages 148.

**Exercise No. 151****Mental Division**

Divide mentally by 7 the answers to Exercise No. 53 as given on pages 163 and 164. Compare your answers with Table I on page 7.

**Exercise No. 152****Continuous Addition Drill**

Count by 12's to 300.

Count by 13's to 325.

Count by 14's to 350.

Count by 15's to 375.

Count by 16's to 400.

Count by 17's to 425.

Count by 18's to 450.

Count by 19's to 475.

Repeat this exercise three times.

**Exercise No. 153****Multiplication Table Drill**

Use Table II on page 48.

Multiply mentally the numbers in Column F by 11, 12, 13, 14, 15, 16, 17, 18 and 19.

Repeat this exercise three times.

**Exercise No. 154****Factoring**

Factor the numbers from 285 to 312 inclusive in the form shown in the table on page 148.

**Exercise No. 155****Mental Division**

Divide mentally by 8 the answers to Exercise No. 56 as given on page 164. Compare your answers with Table I on page 7.

**Exercise No. 156****Mental Multiplication**

Multiply mentally by 19 the numbers in Table I on page 7.

**Exercise No. 157****Factoring**

Factor the numbers from 300 to 328 inclusive in the form shown in the table on page 148.

**Exercise No. 158****Mental Division**

Divide mentally by 9 the answers to Exercise No. 60 as given on page 164. Compare your answers with Table I on page 7 .

**Exercise No. 159****Written Multiplication**

Multiply by 1819 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 19.

**Exercise No. 160****Factoring**

Factor the numbers from 313 to 343 inclusive in the form shown in the table on page 149.

**Exercise No. 161****Mental Division**

Divide mentally by 11 the answers to Exercise No. 61 as given on page 165. Compare your answers with Table I on page 7 .

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### Exercise No. 162

#### Multiplication Table Drill

Use Table II on page 48.

Multiply mentally the numbers in Column G by 12, 13, 14, 15, 16, 17, 18, 19 and 20.

### Exercise No. 163

#### Factoring

Factor the numbers from 329 to 359 inclusive in the form shown in the table on pages 148 and 149.

### Exercise No. 164

#### Mental Division

Divide mentally by 12 the answers to Exercise No. 77 as given on page 166. Compare your answers with Table I on page 7.

### Exercise No. 165

#### Mental Multiplication

Multiply mentally by 20 the numbers in Table I on page 7.

### Exercise No. 166

#### Written Multiplication

Multiply by 1920 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 20.

### Exercise No. 167

#### Factoring

Factor the numbers from 344 to 372 inclusive in the form shown in the table on page 149.

**Exercise No. 168****Mental Division**

Divide mentally by 13 the answers to Exercise No. 90 as given on page 167. Compare your answers with Table I on page 7.

**Exercise No. 169****Continuous Addition Drill**

Count by 13's to 325.

Count by 14's to 350.

Count by 15's to 375.

Count by 16's to 400.

Count by 17's to 425.

Count by 18's to 450.

Count by 19's to 475.

Count by 21's to 525.

**Exercise No. 170****Multiplication Table Drill**

Use Table II on page 48.

Multiply mentally the numbers in Column H by 12, 13, 14, 15, 16, 17, 18, 19, 20 and 21.

**Exercise No. 171****Factoring**

Factor the numbers from 360 to 386 inclusive in the form shown in the table on page 149.

**Exercise No. 172****Mental Multiplication**

Multiply mentally by 21 the numbers in Table I on page 7.

**Exercise No. 173****Written Multiplication**

Multiply by 2021 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 21.

**Exercise No. 174****Factoring**

Factor the numbers from 373 to 399 inclusive in the form shown in the table on pages 149 and 150.

**Exercise No. 175****Mental Division**

Divide mentally by 14 the answers to Exercise No. 106 as given on page 168. Compare your answers with Table I on page 7.

**Exercise No. 176****Continuous Addition Drill**

Count by 14's to 350.

Count by 15's to 375.

Count by 16's to 400.

Count by 17's to 425.

Count by 18's to 450.

Count by 19's to 475.

Count by 21's to 525.

Count by 22's to 550.

Repeat this exercise three times.

**Exercise No. 177****Multiplication Table Drill**

Use Table II on page 48.

Multiply mentally the numbers in Column J by 13, 14, 15, 16, 17, 18, 19, 20, 21 and 22.

**Exercise No. 178****Factoring**

Factor the numbers from 387 to 413 inclusive in the form shown in the table on pages 149 and 150.

**Exercise No. 179****Mental Multiplication**

Multiply mentally by 22 the numbers in Table I on page 7.

**Exercise No. 180****Written Multiplication**

Multiply by 2122 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 22.

**Exercise No. 181****Factoring**

Factor the numbers from 400 to 427 inclusive in the form shown in the table on page 150.



**Exercise No. 182****Mental Division**

Divide mentally by 15 the answers to Exercise No. 119 as given on page 169. Compare your answers with Table I on page 7.

**Exercise No. 183****Continuous Addition Drill**

Count by 15's to 375.

Count by 16's to 400.

Count by 17's to 425.

Count by 18's to 450.

Count by 19's to 475.

Count by 21's to 525.

Count by 22's to 550.

Count by 23's to 575.

Repeat this exercise three times.

**Exercise No. 184****Multiplication Table Drill**

Use Table II on page 48.

Multiply mentally the numbers in Column K by 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23.

**Exercise No. 185****Factoring**

Factor the numbers from 414 to 440 inclusive in the form shown in the table on page 150.

**Exercise No. 186****Mental Multiplication**

Multiply mentally by 23 the numbers in Table I on page 7.

**Exercise No. 187****Written Multiplication**

Multiply by 2223 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 23.

**Exercise No. 188****Factoring**

Factor the numbers from 428 to 455 inclusive in the form shown in the table on page 150.

**Exercise No. 189****Mental Division**

Divide mentally by 16 the answers to Exercise No. 131 as given on pages 169 and 170. Compare your answers with Table I on page 7.

**Exercise No. 190****Continuous Addition Drill**

Count by 16's to 400.

Count by 17's to 425.

Count by 18's to 450.

Count by 19's to 475.

Count by 21's to 525.

Count by 22's to 550.

Count by 23's to 575.

Count by 24's to 600.

Repeat this exercise three times.

**Exercise No. 191****Multiplication Table Drill**

Use Table II on page 48.

Multiply mentally the numbers in Column L by 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24.

**Exercise No. 192****Factoring**

Factor the numbers from 441 to 467 inclusive in the form shown in the table on pages 150 and 151.

**Exercise No. 193****Mental Multiplication**

Multiply mentally by 24 the numbers in Table I on page 7 .

**Exercise No. 194****Written Multiplication**

Multiply by 2324 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 24.

**Exercise No. 195****Factoring**

Factor the numbers from 456 to 479 inclusive in the form shown in the table on pages 150 and 151.

**Exercise No. 196****Mental Division**

Divide mentally by 17 the answers to Exercise No. 140 as given on page 170. Compare your answers with Table I on page 7 .

**Exercise No. 197****Continuous Addition Drill**

Count by 17's to 425.

Count by 18's to 450.

Count by 19's to 475.

Count by 21's to 525.

Count by 22's to 550.

Count by 23's to 575.

Count by 24's to 600.

Count by 25's to 625.

Repeat this exercise three times.

### **Exercise No. 198**

#### **Multiplication Table Drill**

Use Table II on page 48.

Multiply mentally the numbers in Column M by 16, 17, 18, 19, 20, 21, 22, 23, 24 and 25.

### **Exercise No. 199**

#### **Factoring**

Factor the numbers from 468 to 491 inclusive in the form shown in the table on page 151.

### **Exercise No. 200**

#### **Mental Multiplication**

Multiply mentally by 25 the numbers in Table I on page 7.

### **Exercise No. 201**

#### **Written Multiplication**

Multiply by 2425 the numbers in Table III on page 49. Make a single multiplication of pairs of figures in the multiplicand up to 25.

### **Exercise No. 202**

#### **Factoring**

Factor the numbers from 480 to 503 inclusive in the form shown in the table on page 151.

**Exercise No. 203****Mental Division**

Divide mentally by 18 the answers to Exercise No. 148 as given on page 170 and 171. Compare your answers with Table I on page 7.

**Exercise No. 204****Mental Multiplication**

Multiply mentally by 20 the numbers in Table I on page 7.

**Exercise No. 205****Continuous Addition Drill**

Count by 18's to 450.

Count by 19's to 475.

Count by 21's to 525.

Count by 22's to 550.

Count by 23's to 575.

Count by 24's to 600.

Count by 25's to 625.

Repeat this exercise three times.

**Exercise No. 206****Factoring**

Factor the numbers from 492 to 515 inclusive in the form shown in the table on page 151.

**Exercise No. 207****Continuous Addition Drill**

Count by 19's to 475.

Count by 21's to 525.

Count by 22's to 550.

Count by 23's to 575.

Count by 24's to 600.

Count by 25's to 625.

Repeat this exercise three times.

**Exercise No. 208****Mental Multiplication**

Multiply mentally by 30 the numbers in Table I on page 7.

**Exercise No. 209****Factoring**

Factor the numbers from 504 to 527 inclusive in the form shown in the table on page 151.

**Exercise No. 210****Mental Division**

Divide mentally by 19 the answers to Exercise No. 149 as given on page 171. Compare your answers with Table I on page 7.

**Exercise No. 211****Continuous Addition Drill**

Count by 21's to 525.

Count by 22's to 550.

Count by 23's to 575.

Count by 24's to 600.

Count by 25's to 625.

Repeat this exercise three times.

**Exercise No. 212****Mental Multiplication**

Multiply mentally by 40 the numbers in Table I on page 7.

**Exercise No. 213****Factoring**

Factor the numbers from 516 to 539 inclusive in the form shown in the table on page 151.

**Exercise No. 214**

**Continuous Addition Drill**

Count by 22's to 550.

Count by 23's to 575.

Count by 24's to 600.

Count by 25's to 625.

Repeat this exercise three times.

**Exercise No. 215**

**Mental Multiplication**

Multiply mentally by 50 the numbers in Table I on page 7.

**Exercise No. 216**

**Factoring**

Factor the numbers from 528 to 551 inclusive in the form shown in the table on pages 151 and 152.

**Exercise No. 217**

**Continuous Addition Drill**

Count by 23's to 575.

Count by 24's to 600.

Count by 25's to 625.

Repeat this exercise three times.

**Exercise No. 218**

**Mental Division**

Divide mentally by 20 the answers to Exercise No. 165 as given on page 172. Compare your answers with Table I on page 7.

**Exercise No. 219****Mental Multiplication**

Multiply mentally by 60 the numbers in Table I on page 7.

**Exercise No. 220****Factoring**

Factor the numbers from 540 to 564 inclusive in the form shown in the table on page 152.

**Exercise No. 221****Continuous Addition Drill**

Count by 24's to 600.

Count by 25's to 625.

Repeat this exercise three times.

**Exercise No. 222****Mental Multiplication**

Multiply mentally by 70 the numbers in Table I on page 7.

**Exercise No. 223****Factoring**

Factor the numbers from 552 to 576 inclusive in the form shown in the table on page 152.

**Exercise No. 224****Mental Division**

Divide mentally by 21 the answers to Exercise No. 172 as given on page 172. Compare your answers with Table I on page 7.



**Exercise No. 225****Continuous Addition Drill**

Count by 25's to 625.

Repeat this exercise three times.

**Exercise No. 226****Mental Multiplication**

Multiply mentally by 80 the numbers in Table I on page 7 .

**Exercise No. 227****Factoring**

Factor the numbers from 565 to 592 inclusive in the form shown in the table on page 152.

**Exercise No. 228****Mental Multiplication**

Multiply mentally by 90 the numbers in Table I on page 7 .

**Exercise No. 229****Multiplying Three Figures by One**

We are now ready to start the mental multiplication of numbers of three places by numbers of one place. Work from left to right. Immediately name the first partial product as hundreds or thousands. Thus, taking the fourth example, this would be calculated as 800, 900, 902. The fifth example would be figured as 1000, 1120, 1124.

When dealing with numbers in the thousands be sure to consider the thousands as such and not as so many hundreds. If you wish, however, you may shorten the terminology. You may, for instance, think of one thousand one

hundred twenty-six simply as one, one twenty-six, or as one, one two six.

Perform mentally the following multiplications.

1.  $121 \times 2$

8.  $842 \times 2$

15.  $663 \times 2$

2.  $232 \times 2$

9.  $953 \times 2$

16.  $721 \times 2$

3.  $343 \times 2$

10.  $161 \times 2$

17.  $832 \times 2$

4.  $451 \times 2$

11.  $222 \times 2$

18.  $943 \times 2$

5.  $562 \times 2$

12.  $333 \times 2$

19.  $151 \times 2$

6.  $623 \times 2$

13.  $441 \times 2$

20.  $262 \times 2$

7.  $731 \times 2$

14.  $552 \times 2$

### Exercise No. 230

#### Factoring

Factor the numbers from 577 to 605 inclusive in the form shown in the table on page 152.

### Exercise No. 231

#### Mental Division

Divide mentally by 22 the answers to Exercise No. 179 as given on page 173. Compare your answers with Table I on page 7.

### Exercise No. 232

#### Mental Multiplication

Multiply mentally by 110 the numbers in Table I on page 7.

### Exercise No. 233

#### Multiplying Three Figures by One

Perform mentally the following multiplications.

1.  $131 \times 3$

3.  $353 \times 3$

5.  $571 \times 3$

2.  $242 \times 3$

4.  $464 \times 3$

6.  $632 \times 3$

7. $743 \times 3$	12. $344 \times 3$	17. $841 \times 3$
8. $854 \times 3$	13. $451 \times 3$	18. $952 \times 3$
9. $961 \times 3$	14. $562 \times 3$	19. $163 \times 3$
10. $172 \times 3$	15. $673 \times 3$	20. $274 \times 3$
11. $233 \times 3$	16. $734 \times 3$	

**Exercise No. 234****Factoring**

Factor the numbers from 593 to 625 inclusive in the form shown in the table on pages 152 and 153.

**Exercise No. 235****Mental Division**

Divide mentally by 23 the answers to Exercise No. 186 as given on pages 173 and 174. Compare your answers with Table I on page 7.

**Exercise No. 236****Mental Multiplication**

Multiply mentally by 120 the numbers in Table I on page 7.

**Exercise No. 237****Multiplying Three Figures by One**

Perform mentally the following multiplications.

1. $141 \times 4$	8. $863 \times 4$	15. $685 \times 4$
2. $252 \times 4$	9. $974 \times 4$	16. $741 \times 4$
3. $363 \times 4$	10. $185 \times 4$	17. $852 \times 4$
4. $474 \times 4$	11. $241 \times 4$	18. $963 \times 4$
5. $585 \times 4$	12. $352 \times 4$	19. $174 \times 4$
6. $641 \times 4$	13. $463 \times 4$	20. $285 \times 4$
7. $752 \times 4$	14. $574 \times 4$	

**Exercise No. 238****Mental Division**

Divide mentally by 24 the answers to Exercise No. 193 as given on page 174. Compare your answers with Table I on page 7.

**Exercise No. 239****Mental Multiplication**

Multiply mentally by 130 the numbers in Table I on page 7.

**Exercise No. 240****Multiplying Three Figures by One**

Perform mentally the following multiplications.

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1. $151 \times 5$ | 8. $872 \times 5$  | 15. $693 \times 5$ |
| 2. $262 \times 5$ | 9. $983 \times 5$  | 16. $754 \times 5$ |
| 3. $373 \times 5$ | 10. $194 \times 5$ | 17. $865 \times 5$ |
| 4. $484 \times 5$ | 11. $255 \times 5$ | 18. $976 \times 5$ |
| 5. $595 \times 5$ | 12. $366 \times 5$ | 19. $181 \times 5$ |
| 6. $656 \times 5$ | 13. $471 \times 5$ | 20. $292 \times 5$ |
| 7. $761 \times 5$ | 14. $582 \times 5$ |                    |

**Exercise No. 241****Mental Division**

Divide mentally by 25 the answers to Exercise No. 200 as given on pages 174 and 175. Compare your answers with Table I on page 7.

**Exercise No. 242****Mental Multiplication**

Multiply mentally by 140 the numbers in Table I on page 7.

**Exercise No. 243****Multiplying Three Figures by One**

Perform mentally the following multiplications.

1.  $141 \times 6$

8.  $851 \times 6$

15.  $661 \times 6$

2.  $252 \times 6$

9.  $962 \times 6$

16.  $772 \times 6$

3.  $363 \times 6$

10.  $173 \times 6$

17.  $883 \times 6$

4.  $474 \times 6$

11.  $284 \times 6$

18.  $994 \times 6$

5.  $585 \times 6$

12.  $395 \times 6$

19.  $145 \times 6$

6.  $696 \times 6$

13.  $446 \times 6$

20.  $256 \times 6$

7.  $747 \times 6$

14.  $557 \times 6$

**Exercise No. 244****Mental Multiplication**

Multiply mentally by 150 the numbers in Table I on page 7.

**Exercise No. 245****Multiplying Three Figures by One**

Perform mentally the following multiplications.

1.  $131 \times 7$

8.  $838 \times 7$

15.  $637 \times 7$

2.  $242 \times 7$

9.  $941 \times 7$

16.  $748 \times 7$

3.  $353 \times 7$

10.  $152 \times 7$

17.  $851 \times 7$

4.  $464 \times 7$

11.  $263 \times 7$

18.  $962 \times 7$

5.  $575 \times 7$

12.  $374 \times 7$

19.  $173 \times 7$

6.  $686 \times 7$

13.  $485 \times 7$

20.  $284 \times 7$

7.  $797 \times 7$

14.  $596 \times 7$

**Exercise No. 246****Mental Multiplication**

Multiply mentally by 160 the numbers in Table I on page 7.

**Exercise No. 247****Multiplying Three Figures by One**

Perform mentally the following multiplications.

**1.**  $141 \times 8$

**8.**  $858 \times 8$

**15.**  $666 \times 8$

**2.**  $252 \times 8$

**9.**  $969 \times 8$

**16.**  $777 \times 8$

**3.**  $363 \times 8$

**10.**  $171 \times 8$

**17.**  $888 \times 8$

**4.**  $474 \times 8$

**11.**  $282 \times 8$

**18.**  $999 \times 8$

**5.**  $585 \times 8$

**12.**  $393 \times 8$

**19.**  $741 \times 8$

**6.**  $696 \times 8$

**13.**  $444 \times 8$

**20.**  $652 \times 8$

**7.**  $747 \times 8$

**14.**  $555 \times 8$

## FRACTIONS IN GENERAL

The multiplication or the division of fractions will present no difficulty to the student of these pages since it is simply a matter of combining operations in which he is well practised.

What needs more particular attention is the addition and subtraction of the kinds of fractions most commonly encountered in practical work in office, shop and home. The average person would immediately reach for a pencil if asked the sum of  $\frac{3}{4}$  and  $\frac{5}{8}$  or the difference between  $1\frac{1}{3}$  and  $\frac{3}{8}$ . Yet a little practice with calculations of this kind makes it very easy to perform them mentally.

The succeeding examples in addition and subtraction of fractions are based on the possible combinations of two fractions of the orders of halves, quarters, eighths, sixteenths, thirds, sixths, twelfths, fifths and tenths.

These exercises are to stimulate memory and rapid thinking. No instructions are given as to how to perform them because it is assumed that the student is familiar with the reduction of fractions to a common denominator.

### Exercise No. 248

#### Reduction of Fractions

1. Reduce to eighths:  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{3}{4}$
2. Reduce to sixteenths:  $\frac{1}{8}$ ,  $\frac{1}{4}$ ,  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{5}{8}$ ,  $\frac{3}{4}$ ,  $\frac{7}{8}$
3. Reduce to sixths:  $\frac{1}{3}$ ,  $\frac{1}{2}$ ,  $\frac{2}{3}$
4. Reduce to twelfths:  $\frac{1}{6}$ ,  $\frac{1}{4}$ ,  $\frac{1}{3}$ ,  $\frac{1}{2}$ ,  $\frac{2}{3}$ ,  $\frac{3}{4}$ ,  $\frac{5}{6}$
5. Reduce to twenty-fourths:  $\frac{1}{12}$ ,  $\frac{1}{8}$ ,  $\frac{1}{6}$ ,  $\frac{1}{4}$ ,  $\frac{1}{3}$ ,  $\frac{5}{12}$ ,  $\frac{1}{2}$ ,  $\frac{7}{12}$ ,  $\frac{5}{8}$ ,  $\frac{2}{3}$ ,  $\frac{3}{4}$ ,  $\frac{5}{6}$ ,  $\frac{11}{12}$
6. Reduce to tenths:  $\frac{1}{5}$ ,  $\frac{2}{5}$ ,  $\frac{1}{2}$ ,  $\frac{3}{5}$ ,  $\frac{4}{5}$

7. Reduce to twentieths:  $\frac{1}{10}, \frac{1}{5}, \frac{3}{10}, \frac{2}{5}, \frac{1}{2}, \frac{3}{5}, \frac{7}{10}, \frac{4}{5}, \frac{9}{10}$

8. Reduce to fortieths:  $\frac{1}{10}, \frac{1}{5}, \frac{1}{4}, \frac{3}{10}, \frac{3}{8}, \frac{2}{5}, \frac{1}{2}, \frac{3}{5}, \frac{5}{8}, \frac{7}{10}, \frac{3}{4}, \frac{4}{5}, \frac{7}{8}, \frac{9}{10}$

9. Reduce to fifteenths:  $\frac{1}{5}, \frac{1}{3}, \frac{2}{5}, \frac{3}{5}, \frac{2}{3}, \frac{4}{5}$

10. Reduce to thirtieths:  $\frac{1}{10}, \frac{1}{6}, \frac{1}{5}, \frac{3}{10}, \frac{1}{3}, \frac{2}{5}, \frac{1}{2}, \frac{3}{5}, \frac{2}{3}, \frac{7}{10}, \frac{4}{5}, \frac{5}{6}, \frac{9}{10}$

### Exercise No. 249

#### Mental Multiplication

Multiply mentally by 170 the numbers in Table I on page 7.

### Exercise No. 250

#### Addition of Fractions

Add the following mentally.

- |                                 |                                   |                                   |                                   |
|---------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 1. $\frac{1}{2} + \frac{1}{4}$  | 11. $\frac{3}{4} + \frac{1}{8}$   | 21. $\frac{1}{2} + \frac{13}{16}$ | 31. $\frac{3}{4} + \frac{1}{16}$  |
| 2. $\frac{1}{2} + \frac{3}{4}$  | 12. $\frac{3}{4} + \frac{3}{8}$   | 22. $\frac{1}{2} + \frac{15}{16}$ | 32. $\frac{3}{4} + \frac{3}{16}$  |
| 3. $\frac{1}{2} + \frac{1}{8}$  | 13. $\frac{3}{4} + \frac{5}{8}$   | 23. $\frac{1}{4} + \frac{1}{16}$  | 33. $\frac{3}{4} + \frac{5}{16}$  |
| 4. $\frac{1}{2} + \frac{3}{8}$  | 14. $\frac{3}{4} + \frac{7}{8}$   | 24. $\frac{1}{4} + \frac{3}{16}$  | 34. $\frac{3}{4} + \frac{7}{16}$  |
| 5. $\frac{1}{2} + \frac{5}{8}$  | 15. $\frac{1}{2} + \frac{1}{16}$  | 25. $\frac{1}{4} + \frac{5}{16}$  | 35. $\frac{3}{4} + \frac{9}{16}$  |
| 6. $\frac{1}{2} + \frac{7}{8}$  | 16. $\frac{1}{2} + \frac{3}{16}$  | 26. $\frac{1}{4} + \frac{7}{16}$  | 36. $\frac{3}{4} + \frac{11}{16}$ |
| 7. $\frac{1}{4} + \frac{1}{8}$  | 17. $\frac{1}{2} + \frac{5}{16}$  | 27. $\frac{1}{4} + \frac{9}{16}$  | 37. $\frac{3}{4} + \frac{13}{16}$ |
| 8. $\frac{1}{4} + \frac{3}{8}$  | 18. $\frac{1}{2} + \frac{7}{16}$  | 28. $\frac{1}{4} + \frac{11}{16}$ | 38. $\frac{3}{4} + \frac{15}{16}$ |
| 9. $\frac{1}{4} + \frac{5}{8}$  | 19. $\frac{1}{2} + \frac{9}{16}$  | 29. $\frac{1}{4} + \frac{13}{16}$ | 39. $\frac{1}{8} + \frac{1}{16}$  |
| 10. $\frac{1}{4} + \frac{7}{8}$ | 20. $\frac{1}{2} + \frac{11}{16}$ | 30. $\frac{1}{4} + \frac{15}{16}$ | 40. $\frac{1}{8} + \frac{3}{16}$  |

### Exercise No. 251

#### Multiplying Three Figures by One

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1. $152 \times 9$ | 8. $869 \times 9$  | 15. $679 \times 9$ |
| 2. $263 \times 9$ | 9. $973 \times 9$  | 16. $784 \times 9$ |
| 3. $374 \times 9$ | 10. $184 \times 9$ | 17. $895 \times 9$ |
| 4. $485 \times 9$ | 11. $295 \times 9$ | 18. $946 \times 9$ |
| 5. $596 \times 9$ | 12. $346 \times 9$ | 19. $157 \times 9$ |
| 6. $647 \times 9$ | 13. $457 \times 9$ | 20. $268 \times 9$ |
| 7. $758 \times 9$ | 14. $568 \times 9$ |                    |



**Exercise No. 252****Mental Division**

Divide mentally by 2 the answers to Exercise No. 229 as given on page 175.

**Exercise No. 253****Addition of Fractions**

Do the last thirty examples in Exercise No. 250 on the preceding page, and also add the following.

- |                                 |                                  |                                 |                                  |
|---------------------------------|----------------------------------|---------------------------------|----------------------------------|
| 1. $\frac{1}{8} + \frac{5}{16}$ | 4. $\frac{1}{8} + \frac{11}{16}$ | 7. $\frac{3}{8} + \frac{1}{16}$ | 10. $\frac{3}{8} + \frac{7}{16}$ |
| 2. $\frac{1}{8} + \frac{7}{16}$ | 5. $\frac{1}{8} + \frac{13}{16}$ | 8. $\frac{3}{8} + \frac{3}{16}$ |                                  |
| 3. $\frac{1}{8} + \frac{9}{16}$ | 6. $\frac{1}{8} + \frac{15}{16}$ | 9. $\frac{3}{8} + \frac{5}{16}$ |                                  |

**Exercise No. 254****Mental Multiplication**

Multiply mentally by 180 the numbers in Table I on page 7.

**Exercise No. 255****Mental Division**

Divide mentally by 3 the answers to Exercise No. 233 as given on page 175. Compare your answers with Exercise No. 233.

**Exercise No. 256****Addition of Fractions**

Review the last twenty examples in Exercise No. 250 on page 97 and those in Exercise No. 253 on page 98. Also add the following.

- |                                  |                                  |                                 |                                   |
|----------------------------------|----------------------------------|---------------------------------|-----------------------------------|
| 1. $\frac{3}{8} + \frac{9}{16}$  | 4. $\frac{3}{8} + \frac{15}{16}$ | 7. $\frac{5}{8} + \frac{5}{16}$ | 10. $\frac{5}{8} + \frac{11}{16}$ |
| 2. $\frac{3}{8} + \frac{11}{16}$ | 5. $\frac{5}{8} + \frac{1}{16}$  | 8. $\frac{5}{8} + \frac{7}{16}$ |                                   |
| 3. $\frac{3}{8} + \frac{13}{16}$ | 6. $\frac{5}{8} + \frac{5}{16}$  | 9. $\frac{5}{8} + \frac{9}{16}$ |                                   |

**Exercise No. 257****Mental Multiplication**

Multiply mentally by 190 the numbers in Table I on page 7.

**Exercise No. 258****Mental Division**

Divide mentally by 4 the answers to Exercise No. 237 as given on page 175.

**Exercise No. 259****Addition of Fractions**

Review the last ten examples in Exercise No. 250 on page 97, as well as those in Exercise No. 253 on page 98 and Exercise No. 256 on page 98. Also add the following.

- |                                  |                                 |                                  |                                   |
|----------------------------------|---------------------------------|----------------------------------|-----------------------------------|
| 1. $\frac{5}{8} + \frac{13}{16}$ | 4. $\frac{7}{8} + \frac{3}{16}$ | 7. $\frac{7}{8} + \frac{9}{16}$  | 10. $\frac{7}{8} + \frac{15}{16}$ |
| 2. $\frac{5}{8} + \frac{15}{16}$ | 5. $\frac{7}{8} + \frac{5}{16}$ | 8. $\frac{7}{8} + \frac{11}{16}$ |                                   |
| 3. $\frac{7}{8} + \frac{1}{16}$  | 6. $\frac{7}{8} + \frac{7}{16}$ | 9. $\frac{7}{8} + \frac{13}{16}$ |                                   |

**Exercise No. 260****Mental Multiplication**

Multiply mentally by 200 the numbers in Table I on page 7.

**Exercise No. 261****Addition of Fractions**

Review the examples in Exercise No. 253 on page 98, No. 256 on page 98 and No. 259 above. Also add the following.

- |                                 |                                  |                                 |                                   |
|---------------------------------|----------------------------------|---------------------------------|-----------------------------------|
| 1. $\frac{1}{3} + \frac{1}{6}$  | 4. $\frac{1}{3} + \frac{5}{12}$  | 7. $\frac{2}{3} + \frac{1}{12}$ | 10. $\frac{2}{3} + \frac{11}{12}$ |
| 2. $\frac{2}{3} + \frac{1}{6}$  | 5. $\frac{1}{3} + \frac{7}{12}$  | 8. $\frac{2}{3} + \frac{5}{12}$ |                                   |
| 3. $\frac{1}{3} + \frac{1}{12}$ | 6. $\frac{1}{3} + \frac{11}{12}$ | 9. $\frac{2}{3} + \frac{7}{12}$ |                                   |

**Exercise No. 262****Mental Division**

Divide mentally by 5 the answers to Exercise No. 240 as given on page 175.

**Exercise No. 263****Subtraction of Fractions**

Perform mentally the following subtractions.

- |                                 |                                  |                                   |                                   |
|---------------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| 1. $\frac{3}{4} - \frac{1}{2}$  | 8. $\frac{5}{8} - \frac{1}{4}$   | 16. $\frac{11}{16} - \frac{1}{2}$ | 24. $\frac{7}{16} - \frac{1}{4}$  |
| 2. $1\frac{1}{4} - \frac{1}{2}$ | 9. $\frac{7}{8} - \frac{1}{4}$   | 17. $\frac{13}{16} - \frac{1}{2}$ | 25. $\frac{9}{16} - \frac{1}{4}$  |
| 3. $\frac{5}{8} - \frac{1}{2}$  | 10. $1\frac{1}{8} - \frac{1}{4}$ | 18. $\frac{15}{16} - \frac{1}{2}$ | 26. $\frac{11}{16} - \frac{1}{4}$ |
| 4. $\frac{7}{8} - \frac{1}{2}$  | 11. $\frac{7}{8} - \frac{3}{4}$  | 19. $1\frac{1}{16} - \frac{1}{2}$ | 27. $\frac{13}{16} - \frac{1}{4}$ |
| 5. $1\frac{1}{8} - \frac{1}{2}$ | 12. $1\frac{1}{8} - \frac{3}{4}$ | 20. $1\frac{3}{16} - \frac{1}{2}$ | 28. $\frac{15}{16} - \frac{1}{4}$ |
| 6. $1\frac{3}{8} - \frac{1}{2}$ | 13. $1\frac{3}{8} - \frac{3}{4}$ | 21. $1\frac{5}{16} - \frac{1}{2}$ | 29. $1\frac{1}{16} - \frac{1}{4}$ |
| 7. $\frac{3}{8} - \frac{1}{4}$  | 14. $1\frac{5}{8} - \frac{3}{4}$ | 22. $1\frac{7}{16} - \frac{1}{2}$ | 30. $1\frac{3}{16} - \frac{1}{4}$ |
|                                 | 15. $\frac{9}{16} - \frac{1}{2}$ | 23. $\frac{5}{16} - \frac{1}{4}$  |                                   |

**Exercise No. 264****Mental Multiplication**

Multiply mentally by 210 the numbers in Table I on page 7.

**Exercise No. 265****Subtraction of Fractions**

Review the last twenty examples in Exercise No. 263 above, and also perform the following subtractions.

- |                                  |                                  |                                   |                                  |
|----------------------------------|----------------------------------|-----------------------------------|----------------------------------|
| 1. $\frac{13}{16} - \frac{3}{4}$ | 4. $1\frac{3}{16} - \frac{3}{4}$ | 7. $1\frac{9}{16} - \frac{3}{4}$  | 10. $\frac{5}{16} - \frac{1}{8}$ |
| 2. $\frac{15}{16} - \frac{3}{4}$ | 5. $1\frac{5}{16} - \frac{3}{4}$ | 8. $1\frac{11}{16} - \frac{3}{4}$ |                                  |
| 3. $1\frac{1}{16} - \frac{3}{4}$ | 6. $1\frac{7}{16} - \frac{3}{4}$ | 9. $\frac{3}{16} - \frac{1}{8}$   |                                  |

**Exercise No. 266****Mental Division**

Divide mentally by 6 the answers to Exercise No. 243 as given on page 175.

**Exercise No. 267****Addition of Fractions**

Review the examples in Exercise No. 256 on page 98, No. 259 on page 99 and No. 261 on page 99. Also perform the following additions.

- |                                 |                                 |                                 |                                 |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| 1. $\frac{1}{6} + \frac{1}{12}$ | 4. $\frac{1}{6} + \frac{1}{12}$ | 7. $\frac{5}{8} + \frac{7}{12}$ | 10. $\frac{1}{2} + \frac{2}{3}$ |
| 2. $\frac{1}{6} + \frac{5}{12}$ | 5. $\frac{5}{8} + \frac{1}{12}$ | 8. $\frac{5}{8} + \frac{1}{12}$ |                                 |
| 3. $\frac{1}{6} + \frac{7}{12}$ | 6. $\frac{5}{8} + \frac{5}{12}$ | 9. $\frac{1}{2} + \frac{1}{3}$  |                                 |

**Exercise No. 268****Mental Multiplication**

Multiply mentally by 220 the numbers in Table I on page 7.

**Exercise No. 269****Subtraction of Fractions**

Review the last ten examples in Exercise No. 263 on page 100 and No. 265 on page 100. Also perform the following subtractions.

- |                                  |                                  |                                  |                                   |
|----------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| 1. $\frac{7}{16} - \frac{1}{8}$  | 4. $\frac{13}{16} - \frac{1}{8}$ | 7. $\frac{7}{16} - \frac{3}{8}$  | 10. $\frac{13}{16} - \frac{3}{8}$ |
| 2. $\frac{9}{16} - \frac{1}{8}$  | 5. $\frac{15}{16} - \frac{1}{8}$ | 8. $\frac{9}{16} - \frac{3}{8}$  |                                   |
| 3. $\frac{11}{16} - \frac{1}{8}$ | 6. $1\frac{1}{16} - \frac{1}{8}$ | 9. $\frac{11}{16} - \frac{3}{8}$ |                                   |

**Exercise No. 270****Mental Division**

Divide mentally by 7 the answers to Exercise No. 245 as given on page 176.

**Exercise No. 271****Addition of Fractions**

Review the examples in Exercise No. 259 on page 99 , No. 261 on page 99 and No. 267 on page 101. Also perform the following additions.

- |                                |                                |                                |                                 |
|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 1. $\frac{1}{2} + \frac{1}{6}$ | 4. $\frac{1}{4} + \frac{5}{8}$ | 7. $\frac{1}{8} + \frac{1}{6}$ | 10. $\frac{7}{8} + \frac{1}{6}$ |
| 2. $\frac{1}{2} + \frac{5}{8}$ | 5. $\frac{3}{4} + \frac{1}{6}$ | 8. $\frac{3}{8} + \frac{1}{6}$ |                                 |
| 3. $\frac{1}{4} + \frac{1}{6}$ | 6. $\frac{3}{4} + \frac{5}{8}$ | 9. $\frac{5}{8} + \frac{1}{6}$ |                                 |

**Exercise No. 272****Mental Multiplication**

Multiply mentally by 230 the numbers in Table I on page 7 .

**Exercise No. 273****Subtraction of Fractions**

Review the examples in Exercise No. 265 on page 100 and No. 269 on page 101. Also perform the following subtractions.

- |                                  |                                  |                                  |                                   |
|----------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| 1. $\frac{15}{16} - \frac{2}{3}$ | 4. $1\frac{5}{16} - \frac{2}{3}$ | 7. $\frac{15}{16} - \frac{5}{8}$ | 10. $1\frac{5}{16} - \frac{5}{8}$ |
| 2. $1\frac{1}{16} - \frac{2}{3}$ | 5. $\frac{11}{16} - \frac{5}{8}$ | 8. $1\frac{1}{16} - \frac{5}{8}$ |                                   |
| 3. $1\frac{3}{16} - \frac{2}{3}$ | 6. $\frac{13}{16} - \frac{5}{8}$ | 9. $1\frac{3}{16} - \frac{5}{8}$ |                                   |

**Exercise No. 274****Mental Division**

Divide mentally by 8 the answers to Exercise No. 247 as given on page 176.

**Exercise No. 275****Addition of Fractions**

Review the examples in Exercise No. 261 on page 99 , No. 267 on page 101 and No. 271 on this page. Also perform the following additions.

- |                                |                                 |                                 |                                  |
|--------------------------------|---------------------------------|---------------------------------|----------------------------------|
| 1. $\frac{1}{8} + \frac{5}{8}$ | 4. $\frac{7}{8} + \frac{5}{8}$  | 7. $\frac{1}{2} + \frac{7}{12}$ | 10. $\frac{1}{4} + \frac{5}{12}$ |
| 2. $\frac{3}{8} + \frac{5}{8}$ | 5. $\frac{1}{2} + \frac{1}{12}$ | 8. $\frac{1}{2} + \frac{1}{12}$ |                                  |
| 3. $\frac{5}{8} + \frac{5}{8}$ | 6. $\frac{1}{2} + \frac{5}{12}$ | 9. $\frac{1}{4} + \frac{1}{12}$ |                                  |

**Exercise No. 276****Mental Multiplication**

Multiply mentally by 240 the numbers in Table I on page 7.

**Exercise No. 277****Subtraction of Fractions**

Review the examples in Exercise No. 269 on page 101 and No. 273 on page 102. Also perform the following.

- |                                  |                                  |                                   |                                    |
|----------------------------------|----------------------------------|-----------------------------------|------------------------------------|
| 1. $1\frac{7}{16} - \frac{5}{8}$ | 4. $1\frac{1}{16} - \frac{7}{8}$ | 7. $1\frac{7}{16} - \frac{7}{8}$  | 10. $1\frac{13}{16} - \frac{7}{8}$ |
| 2. $1\frac{9}{16} - \frac{5}{8}$ | 5. $1\frac{3}{16} - \frac{7}{8}$ | 8. $1\frac{9}{16} - \frac{7}{8}$  |                                    |
| 3. $1\frac{5}{16} - \frac{7}{8}$ | 6. $1\frac{5}{16} - \frac{7}{8}$ | 9. $1\frac{11}{16} - \frac{7}{8}$ |                                    |

**Exercise No. 278****Mental Division**

Divide mentally by 9 the answers to Exercise No. 251 as given on page 176.

**Exercise No. 279****Addition of Fractions**

Review the examples in Exercise No. 267 on page 101, No. 271 on page 102 and No. 275 on this page. Also perform the following additions.

- |                                 |                                 |                                 |                                  |
|---------------------------------|---------------------------------|---------------------------------|----------------------------------|
| 1. $\frac{1}{4} + \frac{7}{12}$ | 4. $\frac{3}{4} + \frac{5}{12}$ | 7. $\frac{1}{8} + \frac{1}{12}$ | 10. $\frac{1}{8} + \frac{1}{12}$ |
| 2. $\frac{1}{4} + \frac{1}{12}$ | 5. $\frac{3}{4} + \frac{7}{12}$ | 8. $\frac{1}{8} + \frac{5}{12}$ |                                  |
| 3. $\frac{3}{4} + \frac{1}{12}$ | 6. $\frac{3}{4} + \frac{1}{12}$ | 9. $\frac{1}{8} + \frac{7}{12}$ |                                  |

**Exercise No. 280****Mental Multiplication**

Multiply mentally by 250 the numbers in Table I on page 7.

**Exercise No. 281****Subtraction of Fractions**

Review the examples in Exercise No. 273 on page 102 and No. 277 on page 103. Also perform the following subtractions.

- |                                 |                                  |                                  |                                   |
|---------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| 1. $\frac{1}{2} - \frac{1}{3}$  | 4. $\frac{3}{4} - \frac{1}{3}$   | 7. $\frac{3}{4} - \frac{2}{3}$   | 10. $1\frac{7}{12} - \frac{2}{3}$ |
| 2. $\frac{5}{8} - \frac{2}{3}$  | 5. $\frac{11}{12} - \frac{1}{3}$ | 8. $1\frac{1}{12} - \frac{2}{3}$ |                                   |
| 3. $\frac{5}{12} - \frac{1}{3}$ | 6. $1\frac{1}{4} - \frac{1}{3}$  | 9. $1\frac{1}{4} - \frac{2}{3}$  |                                   |

**Exercise No. 282****Mental Division**

Divide mentally the following. Express remainders as such instead of as fractions.

- |                    |                     |                     |
|--------------------|---------------------|---------------------|
| 1. $328 \div 121$  | 8. $1786 \div 842$  | 15. $1998 \div 571$ |
| 2. $593 \div 232$  | 9. $2114 \div 953$  | 16. $690 \div 141$  |
| 3. $794 \div 343$  | 10. $439 \div 161$  | 17. $1208 \div 252$ |
| 4. $1249 \div 451$ | 11. $406 \div 131$  | 18. $1704 \div 363$ |
| 5. $1580 \div 562$ | 12. $776 \div 242$  | 19. $2178 \div 474$ |
| 6. $1835 \div 623$ | 13. $1164 \div 353$ | 20. $2620 \div 585$ |
| 7. $1774 \div 731$ | 14. $1574 \div 464$ |                     |

**Exercise No. 283****Addition of Fractions**

Review the examples in Exercise No. 271 on page 102, No. 275 on page 103 and No. 279 on page 103. Also perform the following additions.

- |                                 |                                  |                                  |                                  |
|---------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 1. $\frac{3}{8} + \frac{1}{12}$ | 4. $\frac{3}{8} + \frac{11}{12}$ | 7. $\frac{5}{8} + \frac{7}{12}$  | 10. $\frac{7}{8} + \frac{5}{12}$ |
| 2. $\frac{3}{8} + \frac{5}{12}$ | 5. $\frac{5}{8} + \frac{1}{12}$  | 8. $\frac{5}{8} + \frac{11}{12}$ |                                  |
| 3. $\frac{3}{8} + \frac{7}{12}$ | 6. $\frac{5}{8} + \frac{5}{12}$  | 9. $\frac{7}{8} + \frac{13}{12}$ |                                  |

## Exercise No. 284

## Multiplying Two Figures by Two

With this exercise we start the general multiplication of two numbers of two places each. You have had some experience with such numbers in using the numbers up to 25 as direct multipliers. In the succeeding exercises, however, the multipliers are greater than 25 and the operation is performed differently.

Multiply the whole of the multiplicand by the first figure of the multiplier; next multiply the whole of the multiplicand by the second figure of the multiplier; and finally add the two partial products.

When you multiply the first figure of the multiplicand by the first figure of the multiplier you will get a number of either three places, as in the first example (where  $20 \times 40$  produces 800), or four places, as in the second example (where  $2 \times 5$  produces 10). Add to this first result as you work along from left to right. Similarly, when you multiply the first figure of the multiplicand by the second figure of the multiplier, you will get a number of either two or three places.

Repeat to yourself the original example and the partial products as often as you find necessary. The need for such repetitions will grow less as you become more practised.

Taking the first example: repeat,  $41 \times 26$ ,  $41 \times 26$ ,  $41 \times 26$ .  $40 \times 20$  is 800,  $1 \times 2$  is 2, 820. (say  $1 \times 2$  rather than  $1 \times 20$  because the former method is simpler when dealing with large numbers. When you think of the 2 as following the 8 it of course becomes a 20 in the product.) Repeat 820, 820, 820.  $40 \times 6$  is 240,  $1 \times 6$  is 6, 246. Repeat  $820 + 246$ ,  $820 + 246$ ,  $820 + 246$ . Add: 1020, 1060, 1066.

The second example is performed: 1000, 1020; 350, 357.  $1020 + 357$ , 1320, 1370, 1377.



Most of the examples in this exercise are very simple and there can be no objection to your shortening the method given, which is a general method applicable to increasingly larger numbers. Thus in the examples illustrated you should be able to note at a glance that the first partial products are 820 and 1020.

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1. $41 \times 26$ | 8. $41 \times 34$  | 15. $41 \times 33$ |
| 2. $51 \times 27$ | 9. $51 \times 26$  | 16. $51 \times 34$ |
| 3. $61 \times 28$ | 10. $61 \times 27$ | 17. $61 \times 26$ |
| 4. $71 \times 29$ | 11. $71 \times 28$ | 18. $71 \times 27$ |
| 5. $81 \times 31$ | 12. $81 \times 29$ | 19. $81 \times 28$ |
| 6. $91 \times 32$ | 13. $91 \times 31$ | 20. $91 \times 29$ |
| 7. $31 \times 33$ | 14. $31 \times 32$ |                    |

### Exercise No. 285

#### Subtraction of Fractions

Review the examples in Exercise No. 277 on page 103 and No. 281 on page 104. Also perform the following subtractions.

- |                                 |                                  |                                  |                                  |
|---------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 1. $\frac{1}{4} - \frac{1}{6}$  | 4. $1\frac{1}{12} - \frac{1}{6}$ | 7. $1\frac{5}{12} - \frac{5}{8}$ | 10. $1\frac{1}{6} - \frac{1}{2}$ |
| 2. $\frac{7}{12} - \frac{1}{6}$ | 5. $\frac{11}{12} - \frac{5}{8}$ | 8. $1\frac{3}{4} - \frac{5}{8}$  |                                  |
| 3. $\frac{3}{4} - \frac{1}{6}$  | 6. $1\frac{1}{4} - \frac{5}{8}$  | 9. $\frac{5}{8} - \frac{1}{2}$   |                                  |

### Exercise No. 286

#### Mental Division

Divide mentally the following.

- |                    |                    |                     |
|--------------------|--------------------|---------------------|
| 1. $445 \div 222$  | 6. $2274 \div 632$ | 11. $2830 \div 641$ |
| 2. $695 \div 333$  | 7. $2747 \div 743$ | 12. $3233 \div 752$ |
| 3. $1258 \div 441$ | 8. $3242 \div 854$ | 13. $3624 \div 863$ |
| 4. $1655 \div 552$ | 9. $3747 \div 961$ | 14. $3989 \div 974$ |
| 5. $1700 \div 663$ | 10. $533 \div 172$ | 15. $902 \div 185$  |

16.  $845 \div 151$

18.  $2013 \div 373$

20.  $3094 \div 595$

17.  $1440 \div 262$

19.  $2564 \div 484$

**Exercise No. 287****Addition of Fractions**

Review the examples in Exercise No. 275 on page 103, No. 279 on page 103 and No. 283 on page 104. Also perform the following additions.

1.  $\frac{7}{8} + \frac{7}{12}$

4.  $\frac{1}{5} + \frac{3}{10}$

7.  $\frac{2}{5} + \frac{1}{10}$

10.  $\frac{2}{5} + \frac{2}{10}$

2.  $\frac{7}{8} + \frac{11}{12}$

5.  $\frac{1}{5} + \frac{7}{10}$

8.  $\frac{2}{5} + \frac{3}{10}$

3.  $\frac{1}{5} + \frac{1}{10}$

6.  $\frac{1}{5} + \frac{2}{10}$

9.  $\frac{2}{5} + \frac{7}{10}$

**Exercise No. 288****Multiplying Two Figures by Two**

In doing exercises of this type always use the second number as the multiplier. Using the first example to illustrate, find 30 times 42 and then 5 times 42; do not work the other way around by finding 40 times 35 and then 2 times 35. This caution is given because of the special way in which the exercises are graded.

1.  $42 \times 35$

8.  $42 \times 43$

15.  $42 \times 42$

2.  $52 \times 36$

9.  $52 \times 35$

16.  $52 \times 43$

3.  $62 \times 37$

10.  $62 \times 36$

17.  $62 \times 34$

4.  $72 \times 38$

11.  $72 \times 37$

18.  $72 \times 35$

5.  $82 \times 39$

12.  $82 \times 38$

19.  $82 \times 36$

6.  $92 \times 41$

13.  $92 \times 39$

20.  $92 \times 37$

7.  $32 \times 42$

14.  $32 \times 41$

**Exercise No. 289****Subtraction of Fractions**

Review the examples in Exercise No. 277 on page 103 and No. 281 on page 104. Also perform the following subtractions.

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- |                                 |                                  |                                  |                                   |
|---------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| 1. $\frac{2}{3} - \frac{1}{2}$  | 4. $1\frac{1}{24} - \frac{1}{4}$ | 7. $\frac{7}{24} - \frac{1}{8}$  | 10. $1\frac{1}{24} - \frac{7}{8}$ |
| 2. $1\frac{1}{3} - \frac{1}{2}$ | 5. $\frac{11}{12} - \frac{3}{4}$ | 8. $\frac{13}{24} - \frac{3}{8}$ |                                   |
| 3. $\frac{5}{12} - \frac{1}{4}$ | 6. $1\frac{7}{12} - \frac{3}{4}$ | 9. $\frac{19}{24} - \frac{5}{8}$ |                                   |

## Exercise No. 290

### Mental Division

- |                    |                     |                     |
|--------------------|---------------------|---------------------|
| 1. $1479 \div 721$ | 8. $1523 \div 451$  | 15. $3012 \div 685$ |
| 2. $2435 \div 832$ | 9. $1966 \div 562$  | 16. $3347 \div 656$ |
| 3. $2036 \div 943$ | 10. $2421 \div 673$ | 17. $4498 \div 761$ |
| 4. $387 \div 151$  | 11. $1156 \div 241$ | 18. $4924 \div 872$ |
| 5. $623 \div 262$  | 12. $1643 \div 352$ | 19. $5547 \div 983$ |
| 6. $745 \div 233$  | 13. $2128 \div 463$ | 20. $1067 \div 194$ |
| 7. $1134 \div 344$ | 14. $2581 \div 574$ |                     |

## Exercise No. 291

### Addition of Fractions

Review the examples in Exercise No. 279 on page 103, No. 283 on page 104 and No. 287 on page 107. Also perform the following additions.

- |                                 |                                 |                                 |                                 |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| 1. $\frac{3}{5} + \frac{1}{10}$ | 4. $\frac{3}{5} + \frac{9}{10}$ | 7. $\frac{4}{5} + \frac{7}{10}$ | 10. $\frac{1}{2} + \frac{2}{5}$ |
| 2. $\frac{3}{5} + \frac{3}{10}$ | 5. $\frac{4}{5} + \frac{1}{10}$ | 8. $\frac{4}{5} + \frac{9}{10}$ |                                 |
| 3. $\frac{3}{5} + \frac{7}{10}$ | 6. $\frac{4}{5} + \frac{3}{10}$ | 9. $\frac{1}{2} + \frac{1}{5}$  |                                 |

## Exercise No. 292

### Mental Multiplication

Multiply mentally the following.

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1. $43 \times 44$ | 8. $43 \times 52$  | 15. $43 \times 51$ |
| 2. $53 \times 45$ | 9. $53 \times 44$  | 16. $53 \times 52$ |
| 3. $63 \times 46$ | 10. $63 \times 45$ | 17. $63 \times 44$ |
| 4. $73 \times 47$ | 11. $73 \times 46$ | 18. $78 \times 45$ |
| 5. $83 \times 48$ | 12. $83 \times 47$ | 19. $83 \times 46$ |
| 6. $93 \times 49$ | 13. $93 \times 48$ | 20. $93 \times 47$ |
| 7. $33 \times 51$ | 14. $33 \times 49$ |                    |

**Exercise No. 293****Subtraction of Fractions**

Review the examples in Exercise No. 281 on page 104 and No. 289 on page 108. Also do the following.

- |                                  |                                  |                                  |                                 |
|----------------------------------|----------------------------------|----------------------------------|---------------------------------|
| 1. $\frac{23}{24} - \frac{1}{8}$ | 4. $1\frac{7}{24} - \frac{7}{8}$ | 7. $1\frac{1}{12} - \frac{1}{2}$ | 10. $\frac{2}{3} - \frac{1}{4}$ |
| 2. $1\frac{5}{24} - \frac{3}{8}$ | 5. $\frac{7}{12} - \frac{1}{2}$  | 8. $1\frac{5}{12} - \frac{1}{2}$ |                                 |
| 3. $1\frac{1}{24} - \frac{5}{8}$ | 6. $1\frac{1}{2} - \frac{1}{2}$  | 9. $\frac{1}{3} - \frac{1}{4}$   |                                 |

**Exercise No. 294****Mental Division**

Divide mentally the following.

- |                    |                     |                     |
|--------------------|---------------------|---------------------|
| 1. $444 \div 131$  | 8. $4716 \div 963$  | 15. $3573 \div 693$ |
| 2. $795 \div 242$  | 9. $815 \div 174$   | 16. $971 \div 141$  |
| 3. $1154 \div 353$ | 10. $1348 \div 285$ | 17. $1712 \div 252$ |
| 4. $1424 \div 464$ | 11. $1421 \div 255$ | 18. $2255 \div 363$ |
| 5. $1767 \div 571$ | 12. $2118 \div 366$ | 19. $2955 \div 474$ |
| 6. $3186 \div 740$ | 13. $2676 \div 471$ | 20. $3820 \div 585$ |
| 7. $3493 \div 852$ | 14. $3375 \div 582$ |                     |

**Exercise No. 295****Addition of Fractions**

Review the examples in Exercise No. 279 on page 103, No. 283 on page 104 and No. 292 on page 108. Also perform the following additions.

- |                                 |                                 |                                |                                 |
|---------------------------------|---------------------------------|--------------------------------|---------------------------------|
| 1. $\frac{1}{2} + \frac{3}{5}$  | 4. $\frac{1}{2} + \frac{3}{10}$ | 7. $\frac{1}{4} + \frac{1}{5}$ | 10. $\frac{1}{4} + \frac{4}{5}$ |
| 2. $\frac{1}{2} + \frac{4}{5}$  | 5. $\frac{1}{2} + \frac{7}{10}$ | 8. $\frac{1}{4} + \frac{2}{5}$ |                                 |
| 3. $\frac{1}{2} + \frac{1}{10}$ | 6. $\frac{1}{2} + \frac{9}{10}$ | 9. $\frac{1}{4} + \frac{3}{5}$ |                                 |

**Exercise No. 296****Mental Multiplication**

Multiply mentally the following.

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1. $44 \times 53$ | 8. $44 \times 61$  | 15. $44 \times 59$ |
| 2. $54 \times 54$ | 9. $54 \times 53$  | 16. $59 \times 61$ |
| 3. $64 \times 55$ | 10. $64 \times 54$ | 17. $64 \times 53$ |
| 4. $74 \times 56$ | 11. $74 \times 55$ | 18. $74 \times 54$ |
| 5. $84 \times 57$ | 12. $84 \times 56$ | 19. $84 \times 55$ |
| 6. $94 \times 58$ | 13. $94 \times 57$ | 20. $94 \times 56$ |
| 7. $34 \times 59$ | 14. $34 \times 58$ |                    |

**Exercise No. 297****Subtraction of Fractions**

Review the examples in Exercise No. 289 on page 108 and No. 293 on page 109. Also perform the following subtractions.

- |                                 |                                 |                                  |                                   |
|---------------------------------|---------------------------------|----------------------------------|-----------------------------------|
| 1. $\frac{5}{8} - \frac{1}{4}$  | 4. $1\frac{1}{6} - \frac{3}{4}$ | 7. $\frac{5}{24} - \frac{1}{8}$  | 10. $1\frac{1}{24} - \frac{1}{8}$ |
| 2. $1\frac{1}{6} - \frac{1}{4}$ | 5. $1\frac{1}{3} - \frac{3}{4}$ | 8. $\frac{13}{24} - \frac{1}{8}$ |                                   |
| 3. $\frac{5}{8} - \frac{3}{4}$  | 6. $1\frac{2}{3} - \frac{3}{4}$ | 9. $\frac{17}{24} - \frac{1}{8}$ |                                   |

**Exercise No. 298****Mental Division**

Divide mentally the following.

- |                    |                     |                     |
|--------------------|---------------------|---------------------|
| 1. $3989 \div 754$ | 8. $5206 \div 851$  | 15. $4089 \div 575$ |
| 2. $4967 \div 865$ | 9. $6381 \div 962$  | 16. $1200 \div 141$ |
| 3. $5192 \div 976$ | 10. $1153 \div 173$ | 17. $2141 \div 252$ |
| 4. $1002 \div 181$ | 11. $982 \div 131$  | 18. $3084 \div 363$ |
| 5. $1566 \div 292$ | 12. $1829 \div 242$ | 19. $4152 \div 474$ |
| 6. $4486 \div 696$ | 13. $2706 \div 353$ | 20. $5101 \div 585$ |
| 7. $4632 \div 747$ | 14. $3433 \div 464$ |                     |

**Exercise No. 299****Addition of Fractions**

Review the examples in Exercise No. 283 on page 104, No. 292 on page 108 and No. 295 on page 109. Also perform the following additions.

1.  $\frac{1}{4} + \frac{1}{10}$

4.  $\frac{1}{4} + \frac{2}{10}$

7.  $\frac{3}{4} + \frac{3}{5}$

10.  $\frac{3}{4} + \frac{3}{10}$

2.  $\frac{1}{4} + \frac{3}{10}$

5.  $\frac{3}{4} + \frac{1}{5}$

8.  $\frac{3}{4} + \frac{4}{5}$

3.  $\frac{1}{4} + \frac{7}{10}$

6.  $\frac{3}{4} + \frac{2}{5}$

9.  $\frac{3}{4} + \frac{1}{10}$

**Exercise No. 300****Mental Multiplication**

Multiply mentally the following.

1.  $45 \times 62$

8.  $45 \times 69$

15.  $45 \times 68$

2.  $55 \times 63$

9.  $55 \times 62$

16.  $55 \times 69$

3.  $65 \times 64$

10.  $65 \times 63$

17.  $65 \times 62$

4.  $75 \times 65$

11.  $75 \times 64$

18.  $75 \times 63$

5.  $85 \times 66$

12.  $85 \times 65$

19.  $85 \times 64$

6.  $95 \times 67$

13.  $95 \times 66$

20.  $95 \times 65$

7.  $35 \times 68$

14.  $35 \times 67$

**Exercise No. 301****Subtraction of Fractions**

Review the examples in Exercise No. 293 on page 109 and No. 297 on page 110. Also perform the following subtractions.

1.  $1\frac{1}{24} - \frac{3}{8}$

4.  $1\frac{7}{24} - \frac{3}{8}$

7.  $1\frac{5}{24} - \frac{5}{8}$

10.  $1\frac{7}{24} - \frac{7}{8}$

2.  $\frac{19}{24} - \frac{3}{8}$

5.  $\frac{17}{24} - \frac{5}{8}$

8.  $1\frac{13}{24} - \frac{5}{8}$

3.  $\frac{23}{24} - \frac{3}{8}$

6.  $1\frac{11}{24} - \frac{5}{8}$

9.  $\frac{23}{24} - \frac{7}{8}$

**Exercise No. 302****Mental Division**

Divide mentally the following.

1.  $1714 \div 284$

3.  $2714 \div 446$

5.  $4617 \div 661$

2.  $2399 \div 395$

4.  $3507 \div 557$

6.  $5303 \div 686$

- |                     |                     |                     |
|---------------------|---------------------|---------------------|
| 7. $5886 \div 797$  | 12. $6588 \div 747$ | 17. $2502 \div 263$ |
| 8. $6665 \div 838$  | 13. $7189 \div 858$ | 18. $3440 \div 374$ |
| 9. $7233 \div 941$  | 14. $8238 \div 969$ | 19. $4450 \div 485$ |
| 10. $1084 \div 152$ | 15. $1385 \div 171$ | 20. $5423 \div 596$ |
| 11. $5757 \div 696$ | 16. $1493 \div 152$ |                     |

**Exercise No. 303****Addition of Fractions**

Review the examples in Exercise No. 292 on page 108, No. 295 on page 109 and No. 299 on page 111. Also perform the following additions.

- |                                 |                                |                                 |                                  |
|---------------------------------|--------------------------------|---------------------------------|----------------------------------|
| 1. $\frac{3}{4} + \frac{7}{10}$ | 4. $\frac{1}{8} + \frac{2}{5}$ | 7. $\frac{1}{8} + \frac{1}{10}$ | 10. $\frac{1}{8} + \frac{9}{10}$ |
| 2. $\frac{3}{4} + \frac{9}{10}$ | 5. $\frac{1}{8} + \frac{3}{5}$ | 8. $\frac{1}{8} + \frac{3}{10}$ |                                  |
| 3. $\frac{1}{8} + \frac{1}{5}$  | 6. $\frac{1}{8} + \frac{4}{5}$ | 9. $\frac{1}{8} + \frac{7}{10}$ |                                  |

**Exercise No. 304****Mental Multiplication**

Multiply mentally the following.

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1. $46 \times 71$ | 8. $46 \times 78$  | 15. $46 \times 77$ |
| 2. $56 \times 72$ | 9. $56 \times 71$  | 16. $56 \times 78$ |
| 3. $66 \times 73$ | 10. $66 \times 72$ | 17. $66 \times 71$ |
| 4. $76 \times 74$ | 11. $76 \times 73$ | 18. $76 \times 72$ |
| 5. $86 \times 75$ | 12. $86 \times 74$ | 19. $86 \times 73$ |
| 6. $96 \times 76$ | 13. $96 \times 75$ | 20. $96 \times 74$ |
| 7. $36 \times 77$ | 14. $36 \times 76$ |                    |

**Exercise No. 305****Subtraction of Fractions**

Review the examples in Exercise No. 297 on page 110 and No. 301 on page 111. Also perform the following subtractions.

- |                                 |                                  |                                  |                                   |
|---------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| 1. $1\frac{1}{2} - \frac{7}{8}$ | 4. $\frac{1}{2} - \frac{1}{8}$   | 7. $\frac{1}{2} - \frac{2}{5}$   | 10. $1\frac{3}{10} - \frac{2}{5}$ |
| 2. $1\frac{1}{2} - \frac{7}{8}$ | 5. $\frac{9}{10} - \frac{1}{5}$  | 8. $\frac{7}{10} - \frac{2}{5}$  |                                   |
| 3. $\frac{3}{10} - \frac{1}{5}$ | 6. $1\frac{1}{10} - \frac{1}{5}$ | 9. $1\frac{1}{10} - \frac{2}{5}$ |                                   |

**Exercise No. 306****Mental Division**

Divide mentally the following.

- |                    |                     |                     |
|--------------------|---------------------|---------------------|
| 1. $5338 \div 772$ | 8. $3606 \div 485$  | 15. $5954 \div 666$ |
| 2. $5393 \div 883$ | 9. $4518 \div 596$  | 16. $5887 \div 647$ |
| 3. $6001 \div 994$ | 10. $4711 \div 637$ | 17. $7123 \div 758$ |
| 4. $908 \div 145$  | 11. $2284 \div 282$ | 18. $8221 \div 869$ |
| 5. $1576 \div 256$ | 12. $3183 \div 393$ | 19. $9257 \div 973$ |
| 6. $1859 \div 263$ | 13. $3956 \div 444$ | 20. $1721 \div 184$ |
| 7. $2736 \div 374$ | 14. $4795 \div 555$ |                     |

**Exercise No. 307****Addition of Fractions**

Review the examples in Exercise No. 295 on page 109, No. 297 on page 110 and No. 303 on page 112. Also perform the following additions.

- |                                |                                 |                                 |                                 |
|--------------------------------|---------------------------------|---------------------------------|---------------------------------|
| 1. $\frac{2}{8} + \frac{1}{8}$ | 4. $\frac{2}{8} + \frac{4}{8}$  | 7. $\frac{2}{8} + \frac{7}{10}$ | 10. $\frac{5}{8} + \frac{2}{8}$ |
| 2. $\frac{2}{8} + \frac{2}{8}$ | 5. $\frac{2}{8} + \frac{1}{10}$ | 8. $\frac{2}{8} + \frac{9}{10}$ |                                 |
| 3. $\frac{3}{8} + \frac{2}{8}$ | 6. $\frac{2}{8} + \frac{3}{10}$ | 9. $\frac{5}{8} + \frac{1}{8}$  |                                 |

**Exercise No. 308****Mental Multiplication**

Perform mentally the following multiplications.

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1. $47 \times 79$ | 8. $47 \times 87$  | 15. $47 \times 86$ |
| 2. $57 \times 81$ | 9. $57 \times 79$  | 16. $57 \times 87$ |
| 3. $67 \times 82$ | 10. $67 \times 81$ | 17. $67 \times 79$ |
| 4. $77 \times 83$ | 11. $77 \times 82$ | 18. $77 \times 81$ |
| 5. $87 \times 84$ | 12. $87 \times 83$ | 19. $87 \times 82$ |
| 6. $97 \times 85$ | 13. $97 \times 84$ | 20. $97 \times 83$ |
| 7. $37 \times 86$ | 14. $37 \times 85$ |                    |



**Exercise No. 309****Subtraction of Fractions**

Review the examples in Exercise No. 301 on page 111 and No. 305 on page 112. Also perform the following subtractions.

- |                                  |                                  |                                  |                                  |
|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 1. $\frac{7}{10} - \frac{3}{8}$  | 4. $1\frac{1}{2} - \frac{3}{8}$  | 7. $1\frac{1}{2} - \frac{4}{5}$  | 10. $\frac{9}{10} - \frac{1}{2}$ |
| 2. $\frac{9}{10} - \frac{3}{8}$  | 5. $\frac{9}{10} - \frac{4}{5}$  | 8. $1\frac{7}{10} - \frac{4}{5}$ |                                  |
| 3. $1\frac{3}{10} - \frac{3}{8}$ | 6. $1\frac{1}{10} - \frac{4}{5}$ | 9. $\frac{7}{10} - \frac{1}{2}$  |                                  |

**Exercise No. 310****Mental Division**

Divide mentally the following.

- |                    |                     |                     |
|--------------------|---------------------|---------------------|
| 1. $5365 \div 748$ | 8. $8304 \div 999$  | 15. $6720 \div 679$ |
| 2. $6599 \div 851$ | 9. $6075 \div 741$  | 16. $7831 \div 784$ |
| 3. $7445 \div 962$ | 10. $5241 \div 652$ | 17. $8917 \div 895$ |
| 4. $1243 \div 173$ | 11. $2682 \div 295$ | 18. $9441 \div 946$ |
| 5. $2220 \div 284$ | 12. $3411 \div 346$ | 19. $1563 \div 157$ |
| 6. $6293 \div 777$ | 13. $4471 \div 457$ | 20. $2627 \div 268$ |
| 7. $7548 \div 888$ | 14. $5667 \div 568$ |                     |

**Exercise No. 311****Addition of Fractions**

Review the examples in Exercise No. 297 on page 110, No. 303 on page 112 and No. 307 on page 113. Also add the following.

- |                                 |                                 |                                |                                 |
|---------------------------------|---------------------------------|--------------------------------|---------------------------------|
| 1. $\frac{5}{8} + \frac{3}{8}$  | 4. $\frac{5}{8} + \frac{3}{10}$ | 7. $\frac{7}{8} + \frac{1}{5}$ | 10. $\frac{7}{8} + \frac{4}{5}$ |
| 2. $\frac{5}{8} + \frac{4}{5}$  | 5. $\frac{5}{8} + \frac{7}{10}$ | 8. $\frac{7}{8} + \frac{2}{5}$ |                                 |
| 3. $\frac{5}{8} + \frac{1}{10}$ | 6. $\frac{5}{8} + \frac{9}{10}$ | 9. $\frac{7}{8} + \frac{3}{5}$ |                                 |

**Exercise No. 312****Mental Multiplication**

Multiply mentally the following.

1.  $48 \times 88$
2.  $58 \times 89$
3.  $68 \times 91$
4.  $78 \times 92$
5.  $88 \times 93$
6.  $98 \times 94$
7.  $38 \times 95$

8.  $48 \times 96$
9.  $58 \times 88$
10.  $68 \times 89$
11.  $78 \times 91$
12.  $88 \times 92$
13.  $98 \times 93$
14.  $38 \times 94$

15.  $48 \times 95$
16.  $58 \times 96$
17.  $68 \times 88$
18.  $78 \times 89$
19.  $88 \times 91$
20.  $98 \times 92$

### Exercise No. 313

#### Subtraction of Fractions

Review the examples in Exercise No. 305 on page 112 and No. 309 on page 114. Also perform the following subtractions.

1.  $1\frac{1}{10} - \frac{1}{2}$
2.  $1\frac{3}{10} - \frac{1}{2}$
3.  $\frac{3}{8} - \frac{1}{2}$
4.  $\frac{4}{5} - \frac{1}{2}$
5.  $1\frac{1}{5} - \frac{1}{2}$
6.  $1\frac{2}{5} - \frac{1}{2}$
7.  $\frac{9}{20} - \frac{1}{4}$
8.  $\frac{13}{20} - \frac{1}{4}$
9.  $\frac{17}{20} - \frac{1}{4}$
10.  $1\frac{1}{20} - \frac{1}{4}$

### Exercise No. 314

#### Addition of Fractions

Review the examples in Exercise No. 303 on page 112, No. 307 on page 113 and No. 311 on page 114. Also perform the following additions.

1.  $\frac{7}{8} + \frac{1}{10}$
2.  $\frac{7}{8} + \frac{3}{10}$
3.  $\frac{7}{8} + \frac{7}{10}$
4.  $\frac{7}{8} + \frac{9}{10}$
5.  $\frac{1}{3} + \frac{1}{5}$
6.  $\frac{1}{3} + \frac{2}{5}$
7.  $\frac{1}{3} + \frac{3}{5}$
8.  $\frac{1}{3} + \frac{4}{5}$
9.  $\frac{1}{3} + \frac{1}{10}$
10.  $\frac{1}{3} + \frac{3}{10}$

### Exercise No. 315

#### Mental Multiplication

Multiply the following mentally.

1.  $49 \times 95$
2.  $59 \times 96$
3.  $69 \times 97$
4.  $79 \times 98$
5.  $89 \times 99$
6.  $99 \times 95$
7.  $39 \times 96$
8.  $49 \times 97$
9.  $59 \times 98$
10.  $69 \times 99$
11.  $79 \times 95$
12.  $89 \times 96$
13.  $99 \times 97$
14.  $39 \times 98$
15.  $49 \times 99$
16.  $59 \times 95$
17.  $69 \times 96$
18.  $79 \times 97$
19.  $89 \times 98$
20.  $99 \times 99$

**Exercise No. 316****Subtraction of Fractions**

Review the examples in Exercise No. 309 on page 114 and No. 313 on page 115. Also perform the following subtractions.

- |                                  |                                  |                                   |                                   |
|----------------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| 1. $\frac{7}{20} - \frac{1}{4}$  | 4. $1\frac{3}{20} - \frac{1}{4}$ | 7. $1\frac{7}{20} - \frac{3}{4}$  | 10. $1\frac{1}{20} - \frac{3}{4}$ |
| 2. $\frac{11}{20} - \frac{1}{4}$ | 5. $\frac{19}{20} - \frac{3}{4}$ | 8. $1\frac{11}{20} - \frac{3}{4}$ |                                   |
| 3. $\frac{19}{20} - \frac{1}{4}$ | 6. $1\frac{3}{20} - \frac{3}{4}$ | 9. $\frac{17}{20} - \frac{3}{4}$  |                                   |

**Exercise No. 317****Addition of Fractions**

Review the examples in Exercise No. 307 on page 113, No. 311 on page 114 and No. 314 on page 115. Also perform the following additions.

- |                                 |                                |                                 |                                  |
|---------------------------------|--------------------------------|---------------------------------|----------------------------------|
| 1. $\frac{1}{3} + \frac{7}{10}$ | 4. $\frac{2}{3} + \frac{3}{5}$ | 7. $\frac{2}{3} + \frac{1}{10}$ | 10. $\frac{2}{3} + \frac{9}{10}$ |
| 2. $\frac{1}{3} + \frac{9}{10}$ | 5. $\frac{2}{3} + \frac{3}{5}$ | 8. $\frac{2}{3} + \frac{3}{10}$ |                                  |
| 3. $\frac{2}{3} + \frac{1}{5}$  | 6. $\frac{2}{3} + \frac{4}{5}$ | 9. $\frac{2}{3} + \frac{7}{10}$ |                                  |

**Exercise No. 318****Subtraction of Fractions**

Review the examples in Exercise No. 313 on page 115 and No. 316 on this page. Also perform the following subtractions.

- |                                   |                                  |                                  |                                   |
|-----------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| 1. $1\frac{9}{20} - \frac{3}{4}$  | 4. $\frac{21}{40} - \frac{1}{8}$ | 7. $\frac{9}{40} - \frac{1}{8}$  | 10. $1\frac{1}{40} - \frac{1}{8}$ |
| 2. $1\frac{13}{20} - \frac{3}{4}$ | 5. $\frac{29}{40} - \frac{1}{8}$ | 8. $\frac{17}{40} - \frac{1}{8}$ |                                   |
| 3. $\frac{13}{40} - \frac{1}{8}$  | 6. $\frac{37}{40} - \frac{1}{8}$ | 9. $\frac{33}{40} - \frac{1}{8}$ |                                   |

**Exercise No. 319****Mental Division**

Divide the following mentally.

- |                   |                   |                   |
|-------------------|-------------------|-------------------|
| 1. $1066 \div 26$ | 3. $1708 \div 28$ | 5. $2511 \div 31$ |
| 2. $1377 \div 27$ | 4. $2059 \div 29$ | 6. $2912 \div 32$ |

- |                    |                    |                    |
|--------------------|--------------------|--------------------|
| 7. $1023 \div 33$  | 12. $2349 \div 29$ | 17. $1586 \div 26$ |
| 8. $1394 \div 34$  | 13. $2821 \div 31$ | 18. $1917 \div 27$ |
| 9. $1326 \div 26$  | 14. $992 \div 32$  | 19. $2268 \div 28$ |
| 10. $1647 \div 27$ | 15. $1353 \div 33$ | 20. $2639 \div 29$ |
| 11. $1988 \div 28$ | 16. $1734 \div 34$ |                    |

**Exercise No. 320****Addition of Fractions**

Review the examples in Exercise No. 311 on page 114, No. 314 on page 115 and No. 315 on page 115. Also perform the following additions.

- |                                |                                 |                                 |                                 |
|--------------------------------|---------------------------------|---------------------------------|---------------------------------|
| 1. $\frac{1}{6} + \frac{1}{8}$ | 4. $\frac{1}{6} + \frac{4}{8}$  | 7. $\frac{1}{6} + \frac{7}{10}$ | 10. $\frac{5}{8} + \frac{2}{8}$ |
| 2. $\frac{1}{6} + \frac{2}{8}$ | 5. $\frac{1}{6} + \frac{1}{10}$ | 8. $\frac{1}{6} + \frac{9}{10}$ |                                 |
| 3. $\frac{1}{6} + \frac{3}{8}$ | 6. $\frac{1}{6} + \frac{9}{10}$ | 9. $\frac{5}{8} + \frac{1}{5}$  |                                 |

**Exercise No. 321****Subtraction of Fractions**

Review the examples in Exercise No. 314 on page 115, No. 316 on page 116 and No. 320 above. Also perform the following subtractions.

- |                                  |                                  |                                   |                                   |
|----------------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| 1. $\frac{23}{40} - \frac{3}{8}$ | 4. $1\frac{7}{40} - \frac{3}{8}$ | 7. $1\frac{3}{40} - \frac{3}{8}$  | 10. $1\frac{1}{40} - \frac{5}{8}$ |
| 2. $\frac{31}{40} - \frac{3}{8}$ | 5. $\frac{19}{40} - \frac{3}{8}$ | 8. $1\frac{11}{40} - \frac{3}{8}$ |                                   |
| 3. $\frac{39}{40} - \frac{3}{8}$ | 6. $\frac{27}{40} - \frac{3}{8}$ | 9. $\frac{33}{40} - \frac{5}{8}$  |                                   |

**Exercise No. 322****Mental Division**

Divide the following mentally.

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1. $1470 \div 35$ | 8. $1806 \div 43$  | 15. $1764 \div 42$ |
| 2. $1872 \div 36$ | 9. $1820 \div 35$  | 16. $2236 \div 43$ |
| 3. $2294 \div 37$ | 10. $2232 \div 36$ | 17. $2108 \div 34$ |
| 4. $2736 \div 38$ | 11. $2664 \div 37$ | 18. $2520 \div 35$ |
| 5. $3198 \div 39$ | 12. $3116 \div 38$ | 19. $2952 \div 36$ |
| 6. $3772 \div 41$ | 13. $3588 \div 39$ | 20. $3404 \div 37$ |
| 7. $1344 \div 42$ | 14. $1312 \div 41$ |                    |

**Exercise No. 323****Addition of Fractions**

Review the examples in Exercise No. 314 on page 115, No. 317 on page 116 and No. 320 on page 117. Also perform the following additions.

1.  $\frac{5}{8} + \frac{3}{8}$

3.  $\frac{5}{8} + \frac{1}{10}$

5.  $\frac{5}{8} + \frac{7}{10}$

2.  $\frac{5}{8} + \frac{4}{8}$

4.  $\frac{5}{8} + \frac{3}{10}$

6.  $\frac{5}{8} + \frac{9}{10}$

**Exercise No. 324****Subtraction of Fractions**

Review the examples in Exercise No. 318 on page 116 and No. 321 on page 117. Also perform the following subtractions.

1.  $1\frac{9}{40} - \frac{5}{8}$

4.  $\frac{37}{40} - \frac{5}{8}$

7.  $1\frac{3}{40} - \frac{7}{8}$

10.  $1\frac{27}{40} - \frac{7}{8}$

2.  $1\frac{17}{40} - \frac{5}{8}$

5.  $1\frac{11}{40} - \frac{5}{8}$

8.  $1\frac{11}{40} - \frac{7}{8}$

3.  $\frac{29}{40} - \frac{5}{8}$

6.  $1\frac{21}{40} - \frac{5}{8}$

9.  $1\frac{19}{40} - \frac{7}{8}$

**Exercise No. 325****Mental Division**

Divide the following mentally.

1.  $1892 \div 44$

8.  $2236 \div 52$

15.  $2193 \div 51$

2.  $2385 \div 45$

9.  $2332 \div 44$

16.  $2756 \div 52$

3.  $2898 \div 46$

10.  $2835 \div 45$

17.  $2772 \div 44$

4.  $3431 \div 47$

11.  $3358 \div 46$

18.  $3285 \div 45$

5.  $3984 \div 48$

12.  $3901 \div 47$

19.  $3818 \div 46$

6.  $4557 \div 49$

13.  $4464 \div 48$

20.  $4371 \div 47$

7.  $1683 \div 51$

14.  $1617 \div 49$

**Exercise No. 326****Addition of Fractions**

Review the examples in Exercise No. 317 on page 116, No. 320 on page 117 and No. 323 on this page.

**Exercise No. 327****Subtraction of Fractions**

Review the examples in Exercise No. 321 on page 117 and No. 324 on page 118. Also perform the following subtractions.

- |                                   |                                   |                                  |                                   |
|-----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|
| 1. $\frac{39}{40} - \frac{7}{8}$  | 4. $1\frac{31}{40} - \frac{7}{8}$ | 7. $\frac{14}{15} - \frac{1}{3}$ | 10. $\frac{19}{30} - \frac{1}{3}$ |
| 2. $1\frac{7}{40} - \frac{7}{8}$  | 5. $\frac{8}{15} - \frac{1}{3}$   | 8. $1\frac{2}{15} - \frac{1}{3}$ |                                   |
| 3. $1\frac{23}{40} - \frac{7}{8}$ | 6. $1\frac{11}{15} - \frac{1}{3}$ | 9. $\frac{13}{30} - \frac{1}{3}$ |                                   |

**Exercise No. 328****Mental Division**

Divide the following mentally.

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1. $2332 \div 53$ | 8. $2684 \div 61$  | 15. $2596 \div 59$ |
| 2. $2916 \div 54$ | 9. $2862 \div 53$  | 16. $3294 \div 61$ |
| 3. $3520 \div 55$ | 10. $3456 \div 54$ | 17. $3392 \div 53$ |
| 4. $4144 \div 56$ | 11. $4070 \div 55$ | 18. $3996 \div 54$ |
| 5. $4788 \div 57$ | 12. $4704 \div 56$ | 19. $4620 \div 55$ |
| 6. $5452 \div 58$ | 13. $5358 \div 57$ | 20. $5264 \div 56$ |
| 7. $2006 \div 59$ | 14. $1972 \div 58$ |                    |

**Exercise No. 329****Addition of Fractions**

Review the examples in Exercise No. 320 on page 117 and 323 on page 118.

**Exercise No. 330****Subtraction of Fractions**

Review the examples in Exercise No. 321 on page 117 and No. 324 on page 118. Also perform the following subtractions.

- |                                  |                                  |                                   |                                    |
|----------------------------------|----------------------------------|-----------------------------------|------------------------------------|
| 1. $1\frac{1}{30} - \frac{1}{3}$ | 4. $1\frac{1}{15} - \frac{2}{3}$ | 7. $\frac{23}{30} - \frac{2}{3}$  | 10. $1\frac{17}{30} - \frac{2}{3}$ |
| 2. $1\frac{7}{30} - \frac{1}{3}$ | 5. $1\frac{4}{15} - \frac{2}{3}$ | 8. $\frac{29}{30} - \frac{2}{3}$  |                                    |
| 3. $\frac{13}{15} - \frac{2}{3}$ | 6. $1\frac{7}{15} - \frac{2}{3}$ | 9. $1\frac{11}{30} - \frac{2}{3}$ |                                    |

**Exercise No. 331****Mental Division**

Divide the following mentally.

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1. $2790 \div 62$ | 8. $3105 \div 69$  | 15. $3060 \div 68$ |
| 2. $3465 \div 63$ | 9. $3410 \div 62$  | 16. $3795 \div 69$ |
| 3. $4160 \div 64$ | 10. $4095 \div 63$ | 17. $4030 \div 62$ |
| 4. $4875 \div 65$ | 11. $4800 \div 64$ | 18. $4725 \div 63$ |
| 5. $5610 \div 66$ | 12. $5525 \div 65$ | 19. $5440 \div 64$ |
| 6. $6365 \div 67$ | 13. $6270 \div 66$ | 20. $6175 \div 65$ |
| 7. $2380 \div 68$ | 14. $2345 \div 67$ |                    |

**Exercise No. 332****Mental Division**

Divide the following mentally.

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1. $3266 \div 71$ | 8. $3588 \div 78$  | 15. $3542 \div 77$ |
| 2. $4032 \div 72$ | 9. $3976 \div 71$  | 16. $4368 \div 78$ |
| 3. $4818 \div 73$ | 10. $4752 \div 72$ | 17. $4686 \div 71$ |
| 4. $5624 \div 74$ | 11. $5548 \div 73$ | 18. $5472 \div 72$ |
| 5. $6450 \div 75$ | 12. $6364 \div 74$ | 19. $6278 \div 73$ |
| 6. $7296 \div 76$ | 13. $7200 \div 75$ | 20. $7104 \div 74$ |
| 7. $2772 \div 77$ | 14. $2736 \div 76$ |                    |

**Exercise No. 333****Subtraction of Fractions**

Review the examples in Exercise No. 324 on page 118 and No. 330 on page 119. Also perform the following subtractions.

- |                                  |                                  |                                  |                                   |
|----------------------------------|----------------------------------|----------------------------------|-----------------------------------|
| 1. $\frac{11}{30} - \frac{1}{6}$ | 4. $\frac{23}{30} - \frac{1}{6}$ | 7. $1\frac{2}{3} - \frac{1}{6}$  | 10. $1\frac{7}{30} - \frac{5}{6}$ |
| 2. $\frac{17}{30} - \frac{1}{6}$ | 5. $\frac{4}{15} - \frac{1}{6}$  | 8. $1\frac{1}{15} - \frac{1}{6}$ |                                   |
| 3. $\frac{23}{30} - \frac{1}{6}$ | 6. $\frac{7}{15} - \frac{1}{6}$  | 9. $1\frac{1}{30} - \frac{5}{6}$ |                                   |

**Exercise No. 334****Mental Division**

Divide the following mentally.

- |                   |                   |                   |
|-------------------|-------------------|-------------------|
| 1. $3713 \div 79$ | 4. $6391 \div 83$ | 7. $3182 \div 86$ |
| 2. $4617 \div 81$ | 5. $7308 \div 84$ | 8. $4089 \div 87$ |
| 3. $5494 \div 82$ | 6. $8245 \div 85$ | 9. $4503 \div 79$ |

- |                    |                    |                    |
|--------------------|--------------------|--------------------|
| 10. $5427 \div 81$ | 14. $3145 \div 85$ | 18. $6237 \div 81$ |
| 11. $6314 \div 82$ | 15. $4042 \div 86$ | 19. $7134 \div 82$ |
| 12. $7221 \div 83$ | 16. $4959 \div 87$ | 20. $8051 \div 83$ |
| 13. $8148 \div 84$ | 17. $5293 \div 79$ |                    |

**Exercise No. 335****Subtraction of Fractions**

Review the examples in Exercise No. 330 on page 119 and No. 333 on page 120. Also perform the following subtractions.

- |                                 |                                  |                                  |
|---------------------------------|----------------------------------|----------------------------------|
| 1. $1\frac{1}{3} - \frac{5}{8}$ | 3. $1\frac{4}{5} - \frac{5}{8}$  | 5. $1\frac{8}{15} - \frac{5}{8}$ |
| 2. $1\frac{1}{3} - \frac{5}{8}$ | 4. $1\frac{2}{15} - \frac{5}{8}$ | 6. $1\frac{1}{15} - \frac{5}{8}$ |

**Exercise No. 336****Mental Division**

Divide the following mentally.

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1. $4224 \div 88$ | 8. $4608 \div 96$  | 15. $4560 \div 95$ |
| 2. $5162 \div 89$ | 9. $5104 \div 88$  | 16. $5568 \div 96$ |
| 3. $6188 \div 91$ | 10. $6052 \div 89$ | 17. $5984 \div 88$ |
| 4. $7176 \div 92$ | 11. $7098 \div 91$ | 18. $6942 \div 89$ |
| 5. $8184 \div 93$ | 12. $8096 \div 92$ | 19. $8008 \div 91$ |
| 6. $9212 \div 94$ | 13. $9114 \div 93$ | 20. $9016 \div 92$ |
| 7. $3610 \div 95$ | 14. $3572 \div 94$ |                    |

**Exercise No. 337****Mental Division**

Divide the following mentally.

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1. $4655 \div 95$ | 8. $4753 \div 97$  | 15. $4851 \div 99$ |
| 2. $5664 \div 96$ | 9. $5782 \div 98$  | 16. $5605 \div 95$ |
| 3. $6693 \div 97$ | 10. $6831 \div 99$ | 17. $6624 \div 96$ |
| 4. $7742 \div 98$ | 11. $7505 \div 95$ | 18. $7663 \div 97$ |
| 5. $8811 \div 99$ | 12. $8544 \div 96$ | 19. $8722 \div 98$ |
| 6. $9405 \div 95$ | 13. $9603 \div 97$ | 20. $9801 \div 99$ |
| 7. $3744 \div 96$ | 14. $3822 \div 98$ |                    |



## DECIMALS IN GENERAL

For the purposes of this book our interest in decimals centers in the equivalence of value between certain decimals and common fractions. Decimal parts of a number that may be represented as simple fractions of that number are known as *aliquot parts* of it. Thus,  $12\frac{1}{2}$ , 25 and  $33\frac{1}{3}$  are aliquot parts of 100, being respectively equal to  $\frac{1}{8}$ ,  $\frac{1}{4}$  and  $\frac{1}{3}$  of 100.

A knowledge of aliquot parts simplifies many arithmetical calculations. Thus if it be required to multiply 7928 by 25, the simplest way is to annex two 0's to 7928, making it 792800, and then divide by 4, since 25 is  $\frac{1}{4}$  of 100. The answer, which may easily be figured mentally, comes to 198200.

Again, if we wanted to know the cost of 25 gross of penholders at  $66\frac{2}{3}\text{¢}$  per dozen, we would figure that 1 gross costs  $\$2\frac{2}{3} \times 12$ , or \$8, and that 25 gross therefore cost \$200.

Everybody with any degree of arithmetical training or experience is familiar with the equivalent decimal values for halves, quarters, eighths, thirds, sixths, fifths, tenths, twentieths, twenty-fifths and fiftieths. It is not difficult to extend the list of memorized values so as to include sixteenths and twelfths, and with this knowledge to make rapid calculations of values in thirty-seconds and twenty-fourths.

The succeeding exercises in decimals are designed toward this end. The student is drilled in representing the values of various fractions as decimals of an increasingly higher number of

places. No tables are given because values are more quickly learned by repeated calculation than by any effort at mere memorization.

### Exercise No. 338

#### Two-Place Decimal Values

Express the following fractions as decimals of two places. Use fractional terminations where necessary. Thus,  $\frac{1}{3}$  expressed as a two-place decimal becomes  $.33\frac{1}{3}$ .

- |                  |                  |                  |                   |
|------------------|------------------|------------------|-------------------|
| 1. $\frac{1}{8}$ | 4. $\frac{7}{8}$ | 7. $\frac{1}{6}$ | 10. $\frac{2}{5}$ |
| 2. $\frac{3}{8}$ | 5. $\frac{1}{3}$ | 8. $\frac{5}{8}$ | 11. $\frac{3}{5}$ |
| 3. $\frac{5}{8}$ | 6. $\frac{2}{3}$ | 9. $\frac{1}{3}$ | 12. $\frac{4}{5}$ |

Repeat this exercise three times.

### Exercise No. 339

#### Multiplying Three Figures by Two

Multiply mentally the following.

No new principles are involved in multiplications of this type. The student is simply asked to apply the methods which he has already learned to larger numbers.

- |                    |                    |                    |                     |
|--------------------|--------------------|--------------------|---------------------|
| 1. $111 \times 26$ | 4. $442 \times 29$ | 7. $721 \times 33$ | 10. $152 \times 27$ |
| 2. $222 \times 27$ | 5. $551 \times 31$ | 8. $832 \times 34$ |                     |
| 3. $331 \times 28$ | 6. $612 \times 32$ | 9. $941 \times 26$ |                     |

### Exercise No. 340

#### Two-Place Decimal Values

Review the examples in Exercise No. 338 above.

Express the following as decimals of two places.

- |                   |                    |                     |                    |
|-------------------|--------------------|---------------------|--------------------|
| 1. $\frac{1}{16}$ | 5. $\frac{9}{16}$  | 9. $\frac{1}{12}$   | 13. $\frac{1}{32}$ |
| 2. $\frac{3}{16}$ | 6. $\frac{11}{16}$ | 10. $\frac{5}{12}$  | 14. $\frac{1}{24}$ |
| 3. $\frac{5}{16}$ | 7. $\frac{13}{16}$ | 11. $\frac{7}{12}$  |                    |
| 4. $\frac{7}{16}$ | 8. $\frac{15}{16}$ | 12. $\frac{11}{12}$ |                    |

Repeat this exercise three times.

## Exercise No. 341

## Multiplying Three Figures by Two

Multiply mentally the following.

- |                    |                    |                    |                     |
|--------------------|--------------------|--------------------|---------------------|
| 1. $121 \times 35$ | 4. $451 \times 38$ | 7. $731 \times 42$ | 10. $161 \times 36$ |
| 2. $232 \times 36$ | 5. $562 \times 39$ | 8. $842 \times 43$ |                     |
| 3. $343 \times 37$ | 6. $623 \times 41$ | 9. $953 \times 35$ |                     |

## SHORT CUTS

There are a number of devices for shortening the work of calculation in specific cases, though most of the methods usually included under this head have only a limited practical value because they are applicable only in highly special cases. A few methods, like horizontal addition and combined addition and subtraction have first-class utility. A variety of short cuts of varying degrees of value are given in the following pages without any attempt to classify them. The student should become familiar with all of them because there is always benefit in viewing numbers from as many angles as possible.

### Exercise No. 342

#### Horizontal Addition

The term *horizontal addition* is applied to the adding of numbers that are not arranged in column form. There is often an unnecessary waste of time in arranging numbers in the form of columns. This is particularly true when the numbers to be added are on bills, invoices, etc. Values on such papers may be totalled by writing down each partial sum as it is arrived at, and then making a final addition.

Consider the first of the following examples. The sum of the units is 37, the sum of the tens is 45, etc. The sums of the various orders are successively set down in the form shown below, and then added.

$$\begin{array}{r} 37 \\ 45 \\ 14 \\ 16 \\ \hline 17887 \end{array}$$

The process might of course be shortened somewhat by adding two orders at a time.

Add the following.

1.  $\$32 + \$183 + \$54 + \$3486 + \$569 + \$9375 + \$85 + \$4103$
2.  $\$875 + \$284 + \$37 + \$5200 + \$398 + \$62 + \$74 + \$2168 + \$720$
3.  $763 + 827 + 49 + 5283 + 768 + 2175$
4.  $1536 + 8973 + 5178 + 926 + 8259 + 36 + 867$
5.  $9365 + 8375 + 1473 + 826 + 4123 + 15378$
6.  $986 + 325 + 7261 + 5820 + 569 + 8371$
7.  $6275 + 5183 + 985 + 3267 + 75 + 1528$
8.  $1738 + 9168 + 8273 + 5298 + 9 + 6832 + 65$
9.  $\$783.52 + \$41.27 + \$837.45 + \$9681.73 + \$48.26 + \$912.78 + \$91.75 + \$683.12 + \$41.83 + \$591.87 + \$291.83 + \$758.32 + \$58.67$
10.  $46235 + 8976 + 5807 + 98397 + 68325 + 892 + 5140 + 6839 + 326 + 2125$

### Exercise No. 343

#### Multiplying Three Figures by Two

Multiply mentally the following.

- |                    |                    |                    |                     |
|--------------------|--------------------|--------------------|---------------------|
| 1. $131 \times 44$ | 4. $464 \times 47$ | 7. $743 \times 51$ | 10. $172 \times 45$ |
| 2. $242 \times 45$ | 5. $571 \times 48$ | 8. $854 \times 52$ |                     |
| 3. $353 \times 46$ | 6. $632 \times 49$ | 9. $961 \times 44$ |                     |

### Exercise No. 344

#### Four-Place Decimal Values

Review the examples in Exercises No. 338 and 340 on page 123.

Express the fractions listed in Exercise No. 340 as decimals of four places. This is done by simply writing the value as parts of 100 of the terminal fractions of the proper two-place decimals. Thus,  $\frac{1}{16}$ , which is  $.06\frac{1}{4}$  as a two-place decimal, becomes  $.0625$  as a decimal of four places. Again,  $\frac{1}{12}$  is  $.08\frac{1}{3}$  or  $.0833\frac{1}{3}$ .

**Exercise No. 345****Multiplying Three Figures by Two**

Multiply mentally the following.

- |                    |                    |                    |                     |
|--------------------|--------------------|--------------------|---------------------|
| 1. $141 \times 53$ | 4. $474 \times 56$ | 7. $752 \times 59$ | 10. $185 \times 54$ |
| 2. $252 \times 54$ | 5. $585 \times 57$ | 8. $863 \times 61$ |                     |
| 3. $363 \times 55$ | 6. $641 \times 58$ | 9. $974 \times 53$ |                     |

**Exercise No. 346****Combined Addition and Subtraction**

It sometimes becomes necessary to subtract the sum of several numbers from a single number. If the numbers to be added are arranged in column form, this may be done at what amounts to one operation by a very simple process.

The numbers may be arranged either as a sum with a missing addend, as in the examples given for practice, or else with the minuend written at the top with underscoring and the difference written at the bottom, as in the examples shown for illustration.

The so-called carry method of subtraction is used. The sum of each successive column is subtracted from the corresponding figure of the minuend plus as many tens as may be necessary to make the subtraction possible. The number of tens thus used is then added to the next column.

To illustrate: from 122808 take the sum of 35635, and 68921.

$$\begin{array}{r} 122808 \\ \hline \end{array}$$

$$\begin{array}{r} 35635 \\ \hline \end{array}$$

$$\begin{array}{r} 68921 \\ \hline \end{array}$$

$$\begin{array}{r} 18252 \end{array}$$

The sum of 5 and 1 is subtracted from 8; write 2 and carry 0. Subtract 5 from 10; write 5 and carry 1 because 1 ten was used to make the subtraction possible. With

1 to carry, the next column adds to 16; subtract this from 18 and again carry 1. The next column adds to 14; subtract this from 22 and carry 2 because 2 tens were needed to make the subtraction possible in this case. Carrying 2 and subtracting from 12 gives the final necessary figure, 1.

The method of carrying may be made still more clear by taking an example that involves larger numbers; from 3744 subtract the sum of 366, 466, 566, 666, 766, 266 and 466.

3744

366

466

566

666

766

266

466

182

The sum of the first column, 42, is subtracted from 44 because 44 is the next higher number ending in 4 from which a subtraction can be made; 4 is carried. The sum of the second column, 46, is subtracted from 54 because 54 is the next higher number ending in 4 from which a subtraction can be made; 5 is carried. The sum of the hundreds' column subtracted from 39 leaves 1.

In the following examples fill in in each case the missing number that will make all the numbers add to the total shown.

1. \$24.96	2. 6016	3. \$29.44	4. 6144
6.24	376	7.36	384
1.56	141	1.84	24576
12.48	188	3.68	3072
.98	1504	58.88	145
3.12	752	1.38	49152
(?)	(?)	(?)	(?)
<hr/> \$149.18	<hr/> 105233	<hr/> \$220.34	<hr/> 181777

5.	864	6. \$168.86	7. \$475.17	8. \$286.09
	108	10.56	46.82	5304.62
	81	1.32	120.08	20463.20
	5296	.96	2461.50	607.05
	3456	2.64	500.07	6315.46
	432	84.48	1208.92	73.90
	(?)	(?)	(?)	(?)
	<hr/> 11965	<hr/> \$944.66	<hr/> \$12933.16	<hr/> \$63452.87

### Exercise No. 347

#### Multiplying Three Figures by Two

Multiply mentally the following.

1.  $151 \times 62$
2.  $262 \times 63$
3.  $373 \times 64$
4.  $484 \times 65$
5.  $595 \times 66$
6.  $656 \times 67$
7.  $761 \times 68$
8.  $872 \times 69$
9.  $983 \times 62$
10.  $194 \times 63$

### Exercise No. 348

#### Five-Place Decimal Values

Review the examples in Exercises No. 338 and 340 on page 123 and No. 344 on page 126.

Express the following fractions as decimals of five places.

To find values in thirty-seconds, add  $.0312\frac{1}{2}$  to the next lower value in sixteenths, etc. The calculation is clearer in the mind if both sixteenths and thirty-seconds are first thought of as decimals of four places. Changing the four-place answer to five places is the work of an instant.

To find values in twenty-fourths, add  $.0416\frac{2}{3}$  to the next lower value in twelfths, etc. In writing answers, drop final  $\frac{1}{3}$ , and raise final  $\frac{2}{3}$  to make the last figure a 7.

1.  $\frac{1}{32}$
2.  $\frac{3}{32}$
3.  $\frac{5}{32}$
4.  $\frac{7}{32}$
5.  $\frac{9}{32}$
6.  $\frac{11}{32}$
7.  $\frac{13}{32}$
8.  $\frac{15}{32}$
9.  $\frac{17}{32}$
10.  $\frac{19}{32}$
11.  $\frac{21}{32}$
12.  $\frac{23}{32}$
13.  $\frac{25}{32}$
14.  $\frac{27}{32}$
15.  $\frac{29}{32}$



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- |                     |                    |                     |                     |                     |
|---------------------|--------------------|---------------------|---------------------|---------------------|
| 16. $\frac{31}{32}$ | 18. $\frac{5}{24}$ | 20. $\frac{11}{24}$ | 22. $\frac{17}{24}$ | 24. $\frac{23}{24}$ |
| 17. $\frac{1}{24}$  | 19. $\frac{7}{24}$ | 21. $\frac{13}{24}$ | 23. $\frac{19}{24}$ |                     |

### Exercise No. 349

#### Multiplying Three Figures by Two

Multiply mentally the following.

- |                    |                    |                    |                     |
|--------------------|--------------------|--------------------|---------------------|
| 1. $141 \times 71$ | 4. $474 \times 74$ | 7. $747 \times 77$ | 10. $173 \times 72$ |
| 2. $252 \times 72$ | 5. $585 \times 75$ | 8. $851 \times 78$ |                     |
| 3. $363 \times 73$ | 6. $696 \times 76$ | 9. $962 \times 71$ |                     |

### Exercise No. 350

#### Multiplying by a Near Number

It sometimes happens that a multiplier is a little more or a little less than 100, 1000, 10000, etc. In cases of this kind it is quickest to multiply by the round number and then add or subtract the necessary difference. For example, multiply \$385.20 by 998. We multiply the dollar value by 1000 and subtract from this product twice \$385.20, thus:

$$\begin{array}{r} \$385200 \\ \underline{770.40} \\ \$384429.60 \end{array}$$

Multiply the following. The student should be able to do most of these mentally.

- |                          |                           |                         |
|--------------------------|---------------------------|-------------------------|
| 1. $\$425 \times 999$    | 4. $\$258.30 \times 104$  | 7. $\$989 \times 992$   |
| 2. $\$865 \times 98$     | 5. $\$827.58 \times 1003$ | 8. $\$99 \times 97$     |
| 3. $\$735.25 \times 998$ | 6. $\$516 \times 1.02$    | 9. $\$1005 \times 1002$ |

### Exercise No. 351

#### Multiplying Three Figures by Two

Multiply mentally the following.

- |                    |                    |                    |                     |
|--------------------|--------------------|--------------------|---------------------|
| 1. $131 \times 79$ | 4. $464 \times 83$ | 7. $797 \times 86$ | 10. $152 \times 81$ |
| 2. $242 \times 81$ | 5. $575 \times 84$ | 8. $838 \times 87$ |                     |
| 3. $353 \times 82$ | 6. $686 \times 85$ | 9. $941 \times 79$ |                     |

**Exercise No. 352****Review of Decimals**

Review the examples in Exercise No. 340 on page 123, No. 344 on page 126 and No. 348 on page 129.

**Exercise No. 353****Multiplying Three Figures by Two**

Multiply mentally the following.

- |                    |                    |                    |                     |
|--------------------|--------------------|--------------------|---------------------|
| 1. $141 \times 88$ | 4. $474 \times 92$ | 7. $747 \times 95$ | 10. $171 \times 89$ |
| 2. $252 \times 89$ | 5. $585 \times 93$ | 8. $858 \times 96$ |                     |
| 3. $363 \times 91$ | 6. $696 \times 94$ | 9. $969 \times 88$ |                     |

**Exercise No. 354****Aliquot Parts in Multiplication**

Reference has already been made to the fact that multiplication may be simplified by considering one of the factors as an aliquot part of some number ending in two or more 0's. Thus,  $628 \times 25$  would be solved by multiplying 628 by 100 and dividing by 4; the answer comes to 15700. Again, multiplying  $56 \times 75$  would be done most quickly by taking  $\frac{3}{4}$  of 56 and then multiplying by 100.

Perform the following multiplications by the method of aliquot parts.

- |                     |                      |                                 |
|---------------------|----------------------|---------------------------------|
| 1. $\$35 \times 15$ | 6. $\$36 \times 25$  | 11. $\$35 \times 18$            |
| 2. $\$42 \times 18$ | 7. $\$52 \times 250$ | 12. $\$28 \times 450$           |
| 3. $\$24 \times 16$ | 8. $\$42 \times 350$ | 13. $\$36 \times 33\frac{1}{3}$ |
| 4. $\$18 \times 45$ | 9. $\$150 \times 48$ | 14. $\$72 \times 16\frac{2}{3}$ |
| 5. $\$72 \times 75$ | 10. $\$64 \times 25$ | 15. $\$96 \times 12\frac{1}{2}$ |

**Exercise No. 355****Multiplying Three Figures by Two**

Multiply mentally the following. Do not use short cuts.

- |                    |                    |                    |                     |
|--------------------|--------------------|--------------------|---------------------|
| 1. $152 \times 95$ | 4. $485 \times 98$ | 7. $758 \times 96$ | 10. $194 \times 99$ |
| 2. $263 \times 96$ | 5. $596 \times 99$ | 8. $869 \times 97$ |                     |
| 3. $374 \times 97$ | 6. $647 \times 95$ | 9. $973 \times 98$ |                     |

**Exercise No. 356****Review of Decimals**

Review the examples in Exercise No. 344 on page 126 and No. 348 on page 129.

**Exercise No. 357****Multiplying Three Figures by Three**

Multiply mentally the following. Add together the first two partial products before determining the third.

- |                     |                     |                      |
|---------------------|---------------------|----------------------|
| 1. $111 \times 101$ | 5. $551 \times 141$ | 9. $941 \times 181$  |
| 2. $222 \times 111$ | 6. $612 \times 151$ | 10. $152 \times 191$ |
| 3. $331 \times 121$ | 7. $721 \times 161$ |                      |
| 4. $442 \times 131$ | 8. $832 \times 171$ |                      |

**Exercise No. 358****Simplifying the Multiplier**

Sometimes a multiplier is of such a nature that one part of it may be taken as an exact multiple of another. In such cases an operation is eliminated by making a single multiplication of the first-found partial product instead of two multiplications of the original multiplicand. In the example at the left above, the 18 in the multiplier is equal to 3 times the 6. We therefore multiply the first partial product by 3 instead of multiplying the original multiplier by 18. In the example at the right, 56 being equal

to 8 times 7, we multiply first by 8, placing the result in the proper position, and then multiply this partial product by 7.

$\begin{array}{r} 2574 \\ \underline{186} \\ 15444 \\ \underline{46332} \\ 478764 \end{array}$	$\begin{array}{r} 5462 \\ \underline{856} \\ 43696 \\ \underline{305872} \\ 4675472 \end{array}$
--	--

Multiply the following by this method.

- |                           |                             |
|---------------------------|-----------------------------|
| 1. $\$385.85 \times 642$  | 5. $\$9541.12 \times 546$   |
| 2. $\$742.50 \times 328$  | 6. $\$172.48 \times 763$    |
| 3. $\$82615 \times 729$   | 7. $\$2153.28 \times 18624$ |
| 4. $\$4265.25 \times 255$ | 8. $\$530.75 \times 16412$  |

## Exercise No. 359

### Multiplying Three Figures by Three

Multiply mentally the following.

- |                     |                     |                      |
|---------------------|---------------------|----------------------|
| 1. $121 \times 202$ | 5. $562 \times 242$ | 9. $953 \times 282$  |
| 2. $232 \times 212$ | 6. $623 \times 252$ | 10. $161 \times 292$ |
| 3. $343 \times 222$ | 7. $731 \times 262$ |                      |
| 4. $451 \times 232$ | 8. $842 \times 272$ |                      |

## Exercise No. 360

### Review of Decimals

Review the examples in Exercise No. 348 on page 129.

## Exercise No. 361

### Multiplying Three Figures by Three

Multiply mentally the following.

- |                     |                     |                      |
|---------------------|---------------------|----------------------|
| 1. $131 \times 303$ | 5. $571 \times 343$ | 9. $961 \times 383$  |
| 2. $242 \times 313$ | 6. $632 \times 353$ | 10. $172 \times 393$ |
| 3. $353 \times 323$ | 7. $743 \times 363$ |                      |
| 4. $464 \times 333$ | 8. $854 \times 373$ |                      |

**Exercise No. 362****Multiplication by Factoring**

When a multiplier can be taken as the product of two factors, it may be quicker to make separate multiplications by each of these factors than to proceed in the ordinary manner. Take the example  $632 \times 156$ . In the illustrations below, the one at the left shows the ordinary method. At the right the multiplier is split up into the factors 13 and 12; the multiplicand is multiplied by 13 and the result is then multiplied by 12.

$\begin{array}{r} 632 \\ 156 \\ \hline 3792 \\ 3160 \\ 632 \\ \hline 98592 \end{array}$	$\begin{array}{r} 632 \\ 13 \\ \hline 8216 \\ 12 \\ \hline 98592 \end{array}$
---	---

Multiply the following by this method.

- |                     |                     |                     |
|---------------------|---------------------|---------------------|
| 1. $759 \times 182$ | 4. $656 \times 285$ | 7. $542 \times 221$ |
| 2. $684 \times 169$ | 5. $309 \times 289$ | 8. $327 \times 224$ |
| 3. $327 \times 228$ | 6. $728 \times 324$ | 9. $986 \times 196$ |

**Exercise No. 363****Multiplying Three Figures by Three**

Multiply mentally the following.

- |                     |                     |                      |
|---------------------|---------------------|----------------------|
| 1. $141 \times 404$ | 5. $585 \times 444$ | 9. $974 \times 484$  |
| 2. $252 \times 414$ | 6. $641 \times 454$ | 10. $185 \times 494$ |
| 3. $363 \times 424$ | 7. $752 \times 464$ |                      |
| 4. $474 \times 434$ | 8. $863 \times 474$ |                      |

**Exercise No. 364****Factors Between 11 and 19**

A quick way to calculate the product of two numbers between 11 and 19 is to add the units of one number to the whole of the other, annex 0 and add the product of the units of both numbers. Thus, to multiply  $16 \times 18$ :

16 and 8 are 24; call this 240 and add 48, making 288. The same result would be reached by adding 6 to 18.

Multiply by this method:

1.  $14 \times 15$

4.  $15 \times 16$

7.  $16 \times 17$

2.  $18 \times 19$

5.  $13 \times 15$

8.  $14 \times 16$

3.  $15 \times 17$

6.  $13 \times 19$

9.  $19 \times 19$

### Exercise No. 365

#### Multiplying Three Figures by Three

Multiply mentally the following.

1.  $151 \times 505$

5.  $595 \times 545$

9.  $983 \times 585$

2.  $262 \times 515$

6.  $656 \times 555$

10.  $194 \times 595$

3.  $373 \times 525$

7.  $761 \times 565$

4.  $484 \times 535$

8.  $872 \times 575$

### Exercise No. 366

#### Multiplying by 11

When the multiplicand consists of two figures the sum of which is less than 10, the product is found by writing the two figures of the multiplicand with their sum between them. Thus, to multiply 62 by 11 we write 6 and 2 with the sum of 6 and 2 between these figures, obtaining 682.

To multiply larger numbers by 11, apply the following rule. Beginning at the right, write the units' figure of the multiplicand, then successively the units plus the tens, the tens plus the hundreds, the hundreds plus the thousands, etc., carrying wherever necessary, and ending with the highest order of the multiplicand, or the highest order plus the carrying figure. Thus, to multiply 4762 by 11: write 2; add 2 and 6 and write 8; add 6 and 7, write 3 and carry 1; add 7 and 4, increase it by the 1 carried, write 2 and carry 1; add this 1 to 4 and write 5. Answer, 52382.

Multiply the following by this method.

- |                           |                           |
|---------------------------|---------------------------|
| 1. $\$5136 \times 11$     | 5. $\$41268.45 \times 11$ |
| 2. $\$72638 \times 11$    | 6. $\$3275.75 \times 11$  |
| 3. $\$514832 \times 11$   | 7. $\$48263.25 \times 11$ |
| 4. $\$37281.05 \times 11$ | 8. $\$94873.30 \times 11$ |

**Exercise No. 367****Multiplying Three Figures by Three**

Multiply mentally the following.

- |                     |                     |                      |
|---------------------|---------------------|----------------------|
| 1. $141 \times 606$ | 5. $585 \times 646$ | 9. $962 \times 686$  |
| 2. $252 \times 616$ | 6. $696 \times 656$ | 10. $173 \times 696$ |
| 3. $363 \times 626$ | 7. $747 \times 666$ |                      |
| 4. $474 \times 636$ | 8. $851 \times 676$ |                      |

**Exercise No. 368****Multiplying by 21, 31, 41, etc.**

Setting down the product from right to left, write the units' figure of the multiplicand, then multiply each order of the multiplicand by the tens' figure of the multiplier, increasing the result in each case by the next higher order of the multiplicand and any necessary carrying figure.

Example, multiply 387 by 41; write 7; multiply 7 by 4, add the 8 of the multiplicand, making 36, write 6 and carry 3; multiply 8 by 4, add the 3 of the multiplicand and the carried 3, making 38, write 8 and carry 3; multiply 3 by 4 and add the carried 3 making 15, write 15. Answer, 15867.

Multiply by this method:

- |                          |                          |
|--------------------------|--------------------------|
| 1. $\$2735.50 \times 51$ | 5. $\$7415.40 \times 61$ |
| 2. $\$1824.75 \times 81$ | 6. $\$8291.25 \times 91$ |
| 3. $\$5104.30 \times 31$ | 7. $\$2134.15 \times 71$ |
| 4. $\$6238.65 \times 21$ | 8. $\$5827.80 \times 41$ |

**Exercise No. 369****Multiplying Three Figures by Three**

Multiply mentally the following.

1.  $131 \times 707$

5.  $575 \times 747$

9.  $941 \times 787$

2.  $242 \times 717$

6.  $686 \times 757$

10.  $152 \times 797$

3.  $353 \times 727$

7.  $797 \times 767$

4.  $464 \times 737$

8.  $838 \times 777$

**Exercise No. 370****Squares of Numbers**

The square of a number is the number multiplied by itself. Squares may be determined quickly if the given number is considered to be the sum of two numbers. In algebra such a sum would ordinarily be taken as  $a + b$  and its square would be  $a^2 + 2ab + b^2$ . In regular arithmetical cases  $a$  becomes the tens of the number and  $b$  the units. Thus, 25 is  $20 + 5$ , and 146 is  $140 + 6$ . The algebraic formula for the square of the sum of two numbers is expressed as the square of the first plus twice the product of the first by the second plus the square of the second. Thus, 25 squared is  $20 \times 20$  (400) plus  $2 \times 20 \times 5$  (200) plus  $5 \times 5$  (25); the total is 625.

In computing squares by this principle you may immediately annex the square of the second to the square of the first, and then add twice the product of the first by the second. Thus in squaring 25 you would immediately say 425, and then add to this  $2 \times 20 \times 5$  (200), making 625. In squaring 146 you immediately say 19636 and add to this  $2 \times 140 \times 6$  (1680), making 21316. Always allow two places for the square of the second. Thus in squaring 61 the first partial product is 3601, to which 120 is added to make 3721.

In squaring numbers on paper the following method will be found rapid where large numbers are involved. Set the given number down twice as if for regular multiplication. Assuming that it is considered to consist of tens and units,



multiply units by units, write units in the result and carry the tens. Add the two given tens together, multiply this sum by the given units, add the carried figure, write tens in the result and carry hundreds. Multiply tens by tens, add the carried figure and write the result.

$$\begin{array}{r} 67 \\ 67 \\ \hline 4489 \end{array}$$

$$\begin{array}{r} 134 \\ 134 \\ \hline 17956 \end{array}$$

$$\begin{array}{r} 1613 \\ 1613 \\ \hline 2601769 \end{array}$$

In the first illustrative example at the left,  $7 \times 7 = 49$ , write 9 and carry 4;  $6 + 6 = 12$ ,  $12 \times 7 = 84$ ,  $84 + 4 = 88$ , write 8 and carry 8;  $6 \times 6 = 36$ ,  $36 + 8 = 44$ .

In the second example,  $4 \times 4 = 16$ , write 6 and carry 1;  $13 + 13 = 26$ ,  $26 \times 4 = 104$ ,  $104 + 1 = 105$ , write 5 and carry 10;  $13 \times 13 = 169$ ,  $169 + 10 = 179$ , write 179.

The third example is worked somewhat differently because here the parts of the number are considered to be 1600 and 13.  $13 \times 13 = 169$ , write 69 (two figures) and carry 1;  $16 + 16 = 32$ ,  $32 \times 13 = 416$ ,  $416 + 1 = 417$ , write 17 and carry 4;  $16 \times 16 = 256$ ,  $256 + 4 = 260$ , write 260.

Find the squares of the following numbers. Do all the examples first by the first method, then by the second method.

- |       |        |        |          |          |
|-------|--------|--------|----------|----------|
| 1. 74 | 4. 64  | 7. 124 | 10. 197  | 13. 1314 |
| 2. 93 | 5. 38  | 8. 146 | 11. 1112 | 14. 1516 |
| 3. 82 | 6. 112 | 9. 168 | 12. 1213 | 15. 1719 |

### Exercise No. 371

#### Multiplying Three Figures by Three

Multiply mentally the following.

- |                     |                     |                      |
|---------------------|---------------------|----------------------|
| 1. $141 \times 808$ | 5. $585 \times 848$ | 9. $969 \times 888$  |
| 2. $252 \times 818$ | 6. $696 \times 858$ | 10. $171 \times 898$ |
| 3. $363 \times 828$ | 7. $747 \times 868$ |                      |
| 4. $474 \times 838$ | 8. $858 \times 878$ |                      |

**Exercise No. 372**

**Multiplying When Units Are Alike**

The following method is a variation of that explained in connection with the squaring of numbers.

$$\begin{array}{r} 47 \\ 67 \\ \hline 3149 \end{array} \qquad \begin{array}{r} 613 \\ 913 \\ \hline 559669 \end{array}$$

In the illustration at the left,  $7 \times 7 = 49$ , write 9 and carry 4;  $6 + 4 = 10$ ,  $10 \times 7 = 70$ ,  $70 + 4 = 74$ , write 4 and carry 7;  $4 \times 6 = 24$ ,  $24 + 7 = 31$ , write 31.

In the illustration at the right,  $13 \times 13 = 169$ , write 69 and carry 1;  $6 + 9 = 15$ ,  $15 \times 13 = 195$ ,  $195 + 1 = 196$ , write 96 and carry 1;  $6 \times 9 = 54$ ,  $54 + 1 = 55$ , write 55.

Perform the following multiplications by this method.

- |                    |                     |                     |
|--------------------|---------------------|---------------------|
| 1. $136 \times 56$ | 4. $195 \times 115$ | 7. $516 \times 816$ |
| 2. $159 \times 79$ | 5. $234 \times 174$ | 8. $714 \times 314$ |
| 3. $172 \times 92$ | 6. $217 \times 197$ | 9. $217 \times 917$ |

**Exercise No. 373**

**Multiplying Three Figures by Three**

- |                     |                     |                      |
|---------------------|---------------------|----------------------|
| 1. $152 \times 909$ | 5. $596 \times 949$ | 9. $973 \times 989$  |
| 2. $263 \times 919$ | 6. $647 \times 959$ | 10. $184 \times 999$ |
| 3. $374 \times 929$ | 7. $758 \times 969$ |                      |
| 4. $485 \times 939$ | 8. $869 \times 979$ |                      |

**Exercise No. 374**

**Multiplying When Tens or Hundreds Are Alike**

This is a variation of the method explained in Exercise No. 372 above.

$$\begin{array}{r} 83 \\ 89 \\ \hline 7387 \end{array} \qquad \begin{array}{r} 717 \\ 714 \\ \hline 511938 \end{array}$$

In the example on page 139,  $3 \times 9 = 27$ , write 7 and carry 2;  $3 + 9 = 12$ ,  $12 \times 8 = 96$ ,  $96 + 2 = 98$ , write 8 and carry 9;  $8 \times 8 = 64$ ,  $64 + 9 = 73$ , write 73.

In the example on page 139,  $17 \times 14 = 238$ , write 38 and carry 2;  $17 + 14 = 31$ ,  $31 \times 7 = 217$ ,  $217 + 2 = 219$ , write 19 and carry 2;  $7 \times 7 = 49$ ,  $49 + 2 = 51$ , write 51.

Multiply the following by this method.

1.  $92 \times 93$

4.  $92 \times 97$

7.  $416 \times 418$

2.  $62 \times 65$

5.  $213 \times 215$

8.  $509 \times 519$

3.  $84 \times 87$

6.  $321 \times 312$

9.  $913 \times 917$

### Exercise No. 375

#### Square of Numbers Ending in 5

If a number to be squared consists of tens and units, and if the units are 5, then twice the product of the first part by the second is equal to the given number of tens. Thus, in  $25 \times 25$ ,  $20 \times 5 \times 2$  is equal to  $20 \times 10$ ; in  $35 \times 35$ ,  $30 \times 5 \times 2$  is equal to  $30 \times 10$ . Accordingly when dealing with numbers of this type we may at once annex 25 to the product of the given tens multiplied by one more than the given tens. That is to say,  $25 \times 25 = 625$ , in which the 6 represents  $3 \times 2$ ;  $35 \times 35 = 1225$  in which the 12 represents  $4 \times 3$ ;  $45 \times 45 = 2025$ , in which the 20 represents  $5 \times 4$ , etc.

Find the squares of the following numbers by this method.

1. 45

4. 75

7. 115

10. 175

13. 335

2. 55

5. 85

8. 135

11. 195

14. 355

3. 65

6. 95

9. 155

12. 315

15. 375

### Exercise No. 376

#### Multiplying Like Tens with Units Making 10

The principle explained above applies to any case in which the tens are alike and the sum of the units is 10.

Thus the product of  $46 \times 44$  is 2024. We arrive at this by multiplying  $4 \times 5$ , making 20, and writing after this the product of  $4 \times 6$  or 24.

Multiply in this manner the following.

- |                   |                     |                     |
|-------------------|---------------------|---------------------|
| 1. $23 \times 27$ | 4. $103 \times 107$ | 7. $178 \times 172$ |
| 2. $41 \times 49$ | 5. $112 \times 118$ | 8. $169 \times 161$ |
| 3. $36 \times 34$ | 6. $154 \times 156$ | 9. $192 \times 198$ |

### Exercise No. 377

#### Squaring Numbers Ending in 25

When a number ends in 25, like 725 for instance, we may take it as the sum of two numbers of which one represents hundreds and the other tens and units. In such cases twice the product of the first part by the second is equal to 50 times the first part. The result of this multiplication is a certain number of thousands.

To find the square of 725 we first write 0625 after the square of 7, making 490625. To this we add as many thousands as are represented by  $7 \times 5$ .  $490625 + 35000 = 525625$ .

Another method of finding these squares is by setting the numbers down as in the following illustration.

$$\begin{array}{r} 725 \\ 725 \\ \hline 525625 \end{array}$$

At once write 625 as the square of 25. Multiply 7 by 5, write 5 and carry 3; multiply 7 by 7, add 3, write 52.

Find the square of the following numbers by both of the foregoing methods.

- |        |         |         |         |          |
|--------|---------|---------|---------|----------|
| 1. 525 | 3. 825  | 5. 1225 | 7. 1625 | 9. 1825  |
| 2. 625 | 4. 1025 | 6. 1325 | 8. 1725 | 10. 1925 |

## Exercise No. 378

## Multiplying a Sum by a Difference

The algebraic product of  $a + b$  and  $a - b$  is  $a^2 - b^2$ . When numbers to be multiplied can be expressed as the sum of and the difference between two numbers, the product equals the square of the first minus the square of the second. Thus  $63 \times 57$  may be expressed as  $60 + 3$  multiplied by  $60 - 3$ . The product equals  $60 \times 60$  minus  $3 \times 3$ . This comes to  $3600 - 9$  or 3591.

There is no limit to the combinations of numbers for which this principle would hold true, but for practical purposes we may be satisfied to recognize those in which the units add to 10 and the tens have a difference of 1.

Multiply the following by this method.

- |                   |                     |                     |
|-------------------|---------------------|---------------------|
| 1. $72 \times 68$ | 4. $101 \times 119$ | 7. $152 \times 168$ |
| 2. $83 \times 77$ | 5. $123 \times 137$ | 8. $173 \times 187$ |
| 3. $94 \times 86$ | 6. $146 \times 154$ | 9. $182 \times 198$ |

## Exercise No. 379

## Multiplying Mixed Numbers with Like Integers

When integers are alike in mixed numbers, as in  $9\frac{1}{4} \times 9\frac{3}{4}$ , their product is found by multiplying one integer by the other plus the sum of the two fractions; to this partial product add that obtained by multiplying together the two fractions.

$$\begin{array}{r}
 9\frac{1}{4} \\
 9\frac{3}{4} \\
 \hline
 90\frac{3}{16}
 \end{array}
 \qquad
 \begin{array}{r}
 8\frac{3}{4} \\
 8\frac{5}{8} \\
 \hline
 76\frac{2}{3} \\
 \frac{5}{8} \\
 \hline
 77\frac{7}{24}
 \end{array}$$

In the illustrative example at the left, 9 is multiplied by  $9 + \frac{1}{4} + \frac{3}{4}$ , or 10. The product of this is 90, and to 90 is added the product of  $\frac{1}{4}$  and  $\frac{3}{4}$ , or  $\frac{3}{16}$ .

In the second example 8 is multiplied by  $8 + \frac{3}{4} + \frac{5}{8}$ , or  $9\frac{7}{8}$ , producing  $76\frac{2}{3}$ . To this is added the product of  $\frac{3}{4} \times \frac{5}{8}$ , or  $\frac{5}{8}$ , making a total of  $77\frac{7}{24}$ .

Multiply the following.

1.  $9\frac{1}{3} \times 9\frac{2}{3}$

5.  $3\frac{1}{3} \times 3\frac{2}{3}$

9.  $5\frac{1}{4} \times 5\frac{1}{2}$

2.  $10\frac{3}{5} \times 10\frac{3}{5}$

6.  $60\frac{3}{5} \times 60\frac{3}{4}$

10.  $8\frac{3}{4} \times 8\frac{1}{3}$

3.  $12\frac{5}{8} \times 12\frac{1}{2}$

7.  $40\frac{3}{8} \times 40\frac{1}{4}$

11.  $6\frac{5}{8} \times 6\frac{3}{8}$

4.  $18\frac{1}{2} \times 18\frac{1}{3}$

8.  $25\frac{3}{5} \times 25\frac{2}{5}$

12.  $12\frac{1}{3} \times 12\frac{5}{9}$

### Exercise No. 380

#### Multiplying by a Number Nearly Whole

Sometimes a multiplier lacks a single fractional unit of being a whole number. Examples would be  $5\frac{2}{3}$ ,  $6\frac{3}{4}$  and  $7\frac{4}{5}$ , which respectively lack  $\frac{1}{3}$ ,  $\frac{1}{4}$  and  $\frac{1}{5}$  of being 6, 7 and 8. In cases of this kind raise the multiplier to the next larger whole number, and after multiplying the multiplicand by this number, subtract from the product the necessary fractional part of the multiplicand. Thus, to multiply 64 by  $3\frac{7}{8}$ , we multiply 64 by 4, obtaining 256, and from this we subtract  $\frac{1}{8}$  of 64, or 8, arriving at a final result of 248.

Multiply by this method the following.

1.  $48 \times 5\frac{3}{4}$

4.  $250 \times 3\frac{4}{5}$

7.  $180 \times 7\frac{9}{10}$

2.  $75 \times 10\frac{2}{3}$

5.  $522 \times 4\frac{8}{9}$

8.  $720 \times 21\frac{1}{2}$

3.  $136 \times 6\frac{5}{8}$

6.  $672 \times 8\frac{7}{8}$

9.  $342 \times 9\frac{5}{6}$

### Exercise No. 381

#### Aliquot Parts in Division

The method of aliquot parts is as applicable to division as it is to multiplication. In ordinary cases we determine how many times the given divisor is contained exactly in some multiple of 10. We multiply the given dividend by the result of such division, and point off the product decimally in such a way as to express division by the proper multiple of 10. Thus, to divide 1840 by 25, we obtain a multiplier of 4 by dividing 25 into 100. Multiplying 1840 by 4 we get 7360, and dividing this decimally by 100 we obtain 73.60

$$6375 \div 7\frac{1}{2}$$

$$\begin{array}{r} 6375 \\ 2125 \\ \hline 850.0 \end{array}$$

Another method of using aliquot parts is illustrated by the example shown above. The problem is to divide 6375 by  $7\frac{1}{2}$ . We note that  $7\frac{1}{2}$  lacks one-third of itself of being 10. We therefore add one-third of itself to 6375 and divide the resulting sum decimally by 10.

Divide by the foregoing methods:

- |                             |                             |                            |
|-----------------------------|-----------------------------|----------------------------|
| 1. $580 \div 25$            | 4. $875 \div 250$           | 7. $1527 \div 150$         |
| 2. $750 \div 16\frac{2}{3}$ | 5. $640 \div 125$           | 8. $918 \div 15$           |
| 3. $450 \div 12\frac{1}{2}$ | 6. $435 \div 33\frac{1}{3}$ | 9. $582 \div 7\frac{1}{2}$ |

### Exercise No. 382

#### Cubes of Numbers

The algebraic formula for the cube of the sum of two numbers,  $a$  and  $b$ , is  $a^3 + 3a^2b + 3ab^2 + b^3$ . This may be expressed as the cube of the first plus three times the square of the first multiplied by the second, plus three times the first multiplied by the square of the second plus the cube of the second.

By applying this formula it is not difficult to calculate mentally the cubes of numbers of two places. Suppose, for instance, that we want to find the cube of 26. We immediately annex the cube of 6 (216) to the cube of 2 (8), obtaining 8216. (Always allow three places for the cube of the second.) Multiplying  $3 \times 400$  (square of 20)  $\times 6$ , we get 7200, which, added to 8216, makes 15416. Multiplying  $3 \times 20 \times 36$  (square of 6) we obtain 2160, which, added to 15416 gives 17576 as the cube of 26.

Cubes may be readily written down from right to left by using a different method.

$26^3$	$6 \times 6 \times 6 = 216$	6
17576	$(6 \times 6 \times 2 \times 3) + 21 = 237$	7
	$(6 \times 2 \times 2 \times 3) + 23 = 95$	5
	$(2 \times 2 \times 2) + 9 = 17$	17

All the necessary writing is shown on p.144 at the left. The method of making the calculation is analyzed at the right. The cube of 6 is 216, write 6 and carry 21. The square of 6 (36) multiplied by 2 (72) multiplied by 3 (216) plus 21 comes to 237, write 7 and carry 23. The product of 6 times the square of 2 (24) multiplied by 3 (72) plus 23 comes to 95, write 5 and carry 9. The cube of 2 is 8, which, added to 9, makes 17.

Before attempting the examples which follow the student ought to make himself thoroughly familiar with the cubes of the numbers from 1 to 9, so that he will not have to slow up to make such computations in the course of the example.

Find the cubes of the following numbers by both of the foregoing methods.

1. 14	4. 46	7. 65	10. 84	13. 95
2. 27	5. 59	8. 71	11. 86	14. 97
3. 33	6. 62	9. 73	12. 88	15. 99

### Exercise No. 383

#### Algebraic Multiplication

Arithmetical products may be directly written down from right to left by using the method of cross-multiplication employed in algebra. A certain pattern is followed in multiplying each figure by every other figure. The operations are best explained by illustration.

	47	345
	26	678
<hr/>	<hr/>	<hr/>
	1222	234910

In the example at the left,  $7 \times 6 = 42$ , write 2 and carry 4; 4 plus  $4 \times 6$  (28) plus  $2 \times 7$  comes to 42, write 2 and carry 4; 4 plus  $4 \times 2$  is 12, write 12. (It is best to start each part of the calculation with the carried number, which otherwise might not be easy to remember.)

In the second example, multiply  $5 \times 8$ ; then  $4 \times 8$  and  $7 \times 5$ ; then  $3 \times 8$ ,  $6 \times 5$  and  $4 \times 7$ ; then  $3 \times 7$  and  $6 \times 4$ ; finally  $3 \times 6$ . Carry as may be necessary.



# THE ART OF CALCULATION

Table IV  
Prime and Composite Numbers

1 Prime	41 Prime	71 Prime	98 = 2 × 49
2 Prime	42 = 2 × 21	72 = 2 × 36	7 × 14
3 Prime	3 × 14	3 × 24	99 = 3 × 33
4 = 2 × 2	6 × 7	4 × 18	9 × 11
5 Prime	43 Prime	6 × 12	100 = 2 × 50
6 = 2 × 3	44 = 2 × 22	8 × 9	4 × 25
7 Prime	45 = 4 × 11	73 Prime	5 × 20
8 = 2 × 4	46 = 3 × 15	74 = 2 × 37	10 × 10
9 = 3 × 3	5 × 9	75 = 3 × 25	101 Prime
10 = 2 × 5	47 Prime	5 × 15	102 = 2 × 51
11 Prime	48 = 2 × 24	76 = 2 × 38	3 × 34
12 = 2 × 6	3 × 16	4 × 19	6 × 17
3 × 4	4 × 12	77 = 7 × 11	103 Prime
13 Prime	6 × 8	78 = 2 × 39	104 = 2 × 52
14 = 2 × 7	49 = 7 × 7	3 × 26	4 × 26
15 = 3 × 5	50 = 2 × 25	6 × 13	8 × 13
16 = 2 × 8	5 × 10	79 Prime	105 = 3 × 35
4 = 4	51 = 3 × 17	80 = 2 × 40	5 × 21
17 Prime	52 = 2 × 26	4 × 20	7 × 15
18 = 2 × 9	4 × 13	5 × 16	106 = 2 × 53
3 × 6	53 Prime	8 × 10	107 Prime
19 Prime	54 = 2 × 27	81 = 3 × 27	108 = 2 × 54
20 = 2 × 10	3 × 18	9 × 9	3 × 36
4 × 5	6 × 9	82 = 2 × 41	4 × 27
21 = 3 × 7	55 = 5 × 11	83 Prime	6 × 18
22 = 2 × 11	56 = 2 × 28	84 = 2 × 42	9 × 12
23 Prime	4 × 14	3 × 28	109 Prime
24 = 2 × 12	7 × 8	4 × 21	110 = 2 × 55
3 × 8	57 = 3 × 19	6 × 14	5 × 22
4 × 6	58 = 2 × 29	7 × 12	10 × 11
25 = 5 × 5	59 Prime	85 = 5 × 17	111 = 3 × 37
26 = 2 × 13	60 = 2 × 30	86 = 2 × 43	112 = 2 × 56
27 = 3 × 9	3 × 20	87 = 3 × 29	4 × 28
28 = 2 × 14	4 × 15	88 = 2 × 44	7 × 16
4 × 7	5 × 12	4 × 22	8 × 14
29 Prime	6 × 10	8 × 11	113 Prime
30 = 2 × 15	61 Prime	89 Prime	114 = 2 × 57
3 × 10	62 = 2 × 31	90 = 2 × 45	3 × 38
5 × 6	63 = 3 × 21	3 × 30	6 × 19
31 Prime	7 × 9	5 × 18	115 = 5 × 23
32 = 2 × 16	64 = 2 × 32	6 × 15	116 = 2 × 58
4 × 8	4 × 16	9 × 10	4 × 29
33 = 3 × 11	8 × 8	91 = 7 × 13	117 = 3 × 39
34 = 2 × 17	65 = 5 × 13	92 = 2 × 46	9 × 13
35 = 5 × 7	66 = 2 × 33	4 × 23	118 = 2 × 59
36 = 2 × 18	3 × 22	93 = 3 × 31	119 = 7 × 17
3 × 12	6 × 11	94 = 2 × 47	120 = 2 × 60
4 × 9	67 Prime	95 = 5 × 19	3 × 40
6 × 6	68 = 2 × 34	96 = 2 × 48	4 × 30
37 Prime	4 × 17	3 × 32	5 × 24
38 = 2 × 19	69 = 3 × 23	4 × 24	6 × 20
39 = 3 × 13	70 = 2 × 35	6 × 16	8 × 15
40 = 2 × 20	5 × 14	8 × 12	10 × 12
4 × 10	7 × 10	97 Prime	121 = 11 × 11
5 × 8			122 = 2 × 61

Table IV (Continued)

123 = $3 \times 41$	149 Prime	173 Prime	196 = $2 \times 98$
124 = $2 \times 62$	150 = $2 \times 75$	174 = $2 \times 87$	$4 \times 49$
$4 \times 31$	$3 \times 50$	$3 \times 58$	$7 \times 28$
125 = $5 \times 25$	$5 \times 30$	$6 \times 29$	$14 \times 14$
126 = $2 \times 63$	$6 \times 25$	175 = $5 \times 35$	197 Prime
$3 \times 42$	$10 \times 15$	$7 \times 25$	198 = $2 \times 99$
$6 \times 21$	151 Prime	176 = $2 \times 88$	$3 \times 66$
$7 \times 18$	152 = $2 \times 76$	$4 \times 44$	$6 \times 33$
$9 \times 14$	$4 \times 38$	$8 \times 22$	$9 \times 22$
127 Prime	$8 \times 19$	$11 \times 16$	$11 \times 18$
128 = $2 \times 64$	153 = $3 \times 51$	177 = $3 \times 59$	199 Prime
$4 \times 32$	$9 \times 17$	178 = $2 \times 89$	200 = $2 \times 100$
$8 \times 16$	154 = $2 \times 77$	179 Prime	$4 \times 50$
129 = $3 \times 43$	$7 \times 22$	180 = $2 \times 90$	$5 \times 40$
130 = $2 \times 65$	$11 \times 14$	$3 \times 60$	$8 \times 25$
$5 \times 26$	155 = $5 \times 31$	$4 \times 45$	$10 \times 20$
$10 \times 13$	156 = $2 \times 78$	$5 \times 36$	201 = $3 \times 67$
131 Prime	$3 \times 52$	$6 \times 30$	202 = $2 \times 101$
132 = $2 \times 66$	$4 \times 39$	$9 \times 20$	203 = $7 \times 29$
$3 \times 44$	$6 \times 26$	$10 \times 18$	204 = $2 \times 102$
$4 \times 33$	$12 \times 13$	$12 \times 15$	$3 \times 68$
$6 \times 22$	157 Prime	181 Prime	$4 \times 51$
$11 \times 12$	158 = $2 \times 79$	182 = $2 \times 91$	$6 \times 34$
133 = $7 \times 19$	159 = $3 \times 53$	$7 \times 26$	$12 \times 17$
134 = $2 \times 67$	160 = $2 \times 80$	$13 \times 14$	205 = $5 \times 41$
135 = $3 \times 45$	$4 \times 40$	183 = $3 \times 61$	206 = $2 \times 103$
$5 \times 27$	$5 \times 32$	184 = $2 \times 92$	207 = $3 \times 69$
$9 \times 15$	$8 \times 20$	$4 \times 46$	$9 \times 23$
136 = $2 \times 68$	$10 \times 16$	$8 \times 23$	208 = $2 \times 104$
$4 \times 34$	161 = $7 \times 23$	185 = $5 \times 37$	$4 \times 52$
$8 \times 17$	162 = $2 \times 81$	186 = $2 \times 93$	$8 \times 26$
137 Prime	$3 \times 54$	$3 \times 62$	$13 \times 16$
138 = $2 \times 69$	$6 \times 27$	$6 \times 31$	209 = $11 \times 19$
$3 \times 46$	$9 \times 18$	187 = $11 \times 17$	210 = $2 \times 105$
$6 \times 23$	163 Prime	188 = $2 \times 94$	$3 \times 70$
139 Prime	164 = $2 \times 82$	$4 \times 47$	$5 \times 42$
140 = $2 \times 70$	$4 \times 41$	189 = $3 \times 63$	$6 \times 35$
$4 \times 35$	165 = $3 \times 55$	$7 \times 27$	$7 \times 30$
$5 \times 28$	$5 \times 33$	$9 \times 21$	$10 \times 21$
$7 \times 20$	$11 \times 15$	190 = $2 \times 95$	$14 \times 15$
$10 \times 14$	166 = $2 \times 83$	$5 \times 38$	211 Prime
141 = $3 \times 47$	167 Prime	$10 \times 19$	212 = $2 \times 106$
142 = $2 \times 71$	168 = $2 \times 84$	191 Prime	$4 \times 53$
143 = $11 \times 13$	$3 \times 56$	192 = $2 \times 96$	213 = $3 \times 71$
144 = $2 \times 72$	$4 \times 42$	$3 \times 64$	214 = $2 \times 107$
$3 \times 48$	$6 \times 28$	$4 \times 48$	215 = $5 \times 43$
$4 \times 36$	$7 \times 24$	$6 \times 32$	216 = $2 \times 108$
$6 \times 24$	$8 \times 21$	$8 \times 24$	$3 \times 72$
$8 \times 18$	$12 \times 14$	$12 \times 16$	$4 \times 54$
$9 \times 16$	169 = $13 \times 13$	193 Prime	$6 \times 36$
$12 \times 12$	170 = $2 \times 85$	194 = $2 \times 97$	$8 \times 27$
145 = $5 \times 29$	$5 \times 34$	195 = $3 \times 65$	$9 \times 24$
146 = $2 \times 73$	$10 \times 17$	$5 \times 39$	$12 \times 18$
147 = $3 \times 49$	171 = $3 \times 57$	$13 \times 15$	217 = $7 \times 31$
$7 \times 21$	$9 \times 19$		218 = $2 \times 109$
148 = $2 \times 74$	172 = $2 \times 86$		219 = $3 \times 73$
$4 \times 37$	$4 \times 43$		

Table IV (Continued)

220 = $2 \times 110$	240 = $2 \times 120$	261 = $3 \times 87$	283 Prime
4 $\times$ 55	3 $\times$ 80	9 $\times$ 29	284 = $2 \times 142$
5 $\times$ 44	4 $\times$ 60	262 = $2 \times 131$	4 $\times$ 71
10 $\times$ 22	5 $\times$ 48	263 Prime	285 = $3 \times 95$
11 $\times$ 20	6 $\times$ 40	264 = $2 \times 132$	5 $\times$ 57
221 = $13 \times 17$	8 $\times$ 30	3 $\times$ 88	15 $\times$ 19
222 = $2 \times 111$	10 $\times$ 24	4 $\times$ 66	286 = $2 \times 143$
3 $\times$ 74	12 $\times$ 20	6 $\times$ 44	11 $\times$ 26
6 $\times$ 37	15 $\times$ 16	8 $\times$ 33	13 $\times$ 22
223 Prime	241 Prime	11 $\times$ 24	287 = $7 \times 41$
224 = $2 \times 112$	242 = $2 \times 121$	12 $\times$ 22	288 = $2 \times 144$
4 $\times$ 56	11 $\times$ 22	265 = $5 \times 53$	3 $\times$ 96
7 $\times$ 32	243 = $3 \times 81$	266 = $2 \times 133$	4 $\times$ 72
8 $\times$ 28	9 $\times$ 27	7 $\times$ 38	6 $\times$ 48
14 $\times$ 16	244 = $2 \times 122$	14 $\times$ 19	8 $\times$ 36
225 = $3 \times 75$	4 $\times$ 61	267 = $3 \times 89$	9 $\times$ 32
5 $\times$ 45	245 = $5 \times 49$	268 = $2 \times 134$	12 $\times$ 24
9 $\times$ 25	7 $\times$ 35	4 $\times$ 67	16 $\times$ 18
15 $\times$ 15	246 = $2 \times 123$	269 Prime	289 = $17 \times 17$
226 = $2 \times 113$	3 $\times$ 82	270 = $2 \times 135$	290 = $2 \times 145$
227 Prime	6 $\times$ 41	3 $\times$ 90	5 $\times$ 58
228 = $2 \times 114$	247 = $13 \times 19$	5 $\times$ 54	10 $\times$ 29
3 $\times$ 76	248 = $2 \times 124$	6 $\times$ 45	291 = $3 \times 97$
4 $\times$ 57	4 $\times$ 62	9 $\times$ 30	292 = $2 \times 146$
6 $\times$ 38	8 $\times$ 31	10 $\times$ 27	4 $\times$ 73
12 $\times$ 19	249 = $3 \times 83$	15 $\times$ 18	293 Prime
229 Prime	250 = $2 \times 125$	271 Prime	294 = $2 \times 147$
230 = $2 \times 115$	5 $\times$ 50	272 = $2 \times 136$	3 $\times$ 98
5 $\times$ 46	10 $\times$ 25	4 $\times$ 68	6 $\times$ 49
10 $\times$ 23	251 Prime	8 $\times$ 34	7 $\times$ 42
231 = $3 \times 77$	252 = $2 \times 126$	16 $\times$ 17	14 $\times$ 21
7 $\times$ 33	3 $\times$ 84	273 = $3 \times 91$	295 = $5 \times 59$
11 $\times$ 21	4 $\times$ 63	7 $\times$ 39	296 = $2 \times 148$
232 = $2 \times 116$	6 $\times$ 42	13 $\times$ 21	4 $\times$ 74
4 $\times$ 58	7 $\times$ 36	274 = $2 \times 137$	8 $\times$ 37
8 $\times$ 29	9 $\times$ 28	275 = $5 \times 55$	297 = $3 \times 99$
233 Prime	12 $\times$ 21	11 $\times$ 25	9 $\times$ 33
234 = $2 \times 117$	14 $\times$ 18	276 = $2 \times 138$	11 $\times$ 27
3 $\times$ 78	253 = $11 \times 23$	3 $\times$ 92	298 = $2 \times 149$
6 $\times$ 39	254 = $2 \times 127$	4 $\times$ 69	299 = $13 \times 23$
9 $\times$ 26	255 = $3 \times 85$	6 $\times$ 46	300 = $2 \times 150$
13 $\times$ 18	5 $\times$ 51	12 $\times$ 23	3 $\times$ 100
235 = $5 \times 47$	15 $\times$ 17	277 Prime	4 $\times$ 75
236 = $2 \times 118$	256 = $2 \times 128$	278 = $2 \times 139$	5 $\times$ 60
4 $\times$ 59	4 $\times$ 64	279 = $3 \times 93$	6 $\times$ 50
237 = $3 \times 79$	8 $\times$ 32	9 $\times$ 31	10 $\times$ 30
238 = $2 \times 119$	16 $\times$ 16	280 = $2 \times 140$	12 $\times$ 20
7 $\times$ 34	257 Prime	4 $\times$ 70	15 $\times$ 25
14 $\times$ 17	258 = $2 \times 129$	5 $\times$ 56	301 = $7 \times 43$
239 Prime	3 $\times$ 86	7 $\times$ 40	302 = $2 \times 151$
	6 $\times$ 43	8 $\times$ 35	303 = $3 \times 101$
	259 = $7 \times 37$	10 $\times$ 28	304 = $2 \times 152$
	260 = $2 \times 130$	14 $\times$ 20	4 $\times$ 76
	4 $\times$ 65	281 Prime	8 $\times$ 38
	5 $\times$ 52	282 = $2 \times 141$	16 $\times$ 19
	10 $\times$ 26	3 $\times$ 94	305 = $5 \times 61$
	13 $\times$ 20	6 $\times$ 47	

Table IV (Continued)

306 = $2 \times 153$	326 = $2 \times 163$	348 = $2 \times 174$	368 = $2 \times 184$
$3 \times 102$	327 = $3 \times 109$	$3 \times 116$	$4 \times 92$
$6 \times 51$	328 = $2 \times 164$	$4 \times 87$	$8 \times 46$
$9 \times 34$	$4 \times 82$	$6 \times 58$	$16 \times 23$
$17 \times 18$	$8 \times 41$	$12 \times 29$	369 = $3 \times 123$
307 Prime	329 = $7 \times 47$	349 Prime	$9 \times 41$
308 = $2 \times 154$	330 = $2 \times 165$	350 = $2 \times 175$	370 = $2 \times 185$
$4 \times 77$	$3 \times 110$	$5 \times 70$	$5 \times 74$
$7 \times 44$	$5 \times 66$	$7 \times 50$	$10 \times 37$
$11 \times 28$	$6 \times 55$	$10 \times 35$	371 = $5 \times 53$
$14 \times 22$	$10 \times 33$	$14 \times 25$	372 = $2 \times 186$
309 = $3 \times 103$	$11 \times 30$	351 = $3 \times 117$	$3 \times 124$
310 = $2 \times 155$	$15 \times 22$	$9 \times 39$	$4 \times 93$
$5 \times 62$	331 Prime	$13 \times 27$	$6 \times 62$
$10 \times 31$	332 = $2 \times 166$	352 = $2 \times 176$	$12 \times 31$
311 = Prime	$4 \times 83$	$4 \times 88$	373 Prime
312 = $2 \times 156$	333 = $3 \times 111$	$8 \times 44$	374 = $2 \times 187$
$3 \times 104$	$9 \times 37$	$11 \times 32$	$11 \times 34$
$4 \times 78$	334 = $2 \times 167$	$16 \times 22$	$17 \times 22$
$6 \times 52$	335 = $5 \times 67$	353 Prime	375 = $3 \times 125$
$8 \times 39$	336 = $2 \times 168$	354 = $2 \times 177$	$5 \times 75$
$12 \times 26$	$3 \times 112$	$3 \times 118$	$15 \times 25$
$13 \times 24$	$4 \times 84$	$6 \times 59$	376 = $2 \times 188$
313 Prime	$6 \times 56$	355 = $5 \times 71$	$4 \times 94$
314 = $2 \times 157$	$7 \times 48$	356 = $2 \times 178$	$8 \times 47$
315 = $3 \times 105$	$8 \times 42$	$4 \times 89$	377 = $13 \times 29$
$5 \times 63$	$12 \times 28$	357 = $3 \times 119$	378 = $2 \times 189$
$7 \times 45$	$14 \times 24$	$7 \times 51$	$3 \times 126$
$9 \times 35$	$16 \times 21$	$17 \times 21$	$6 \times 63$
$15 \times 21$	337 Prime	358 = $2 \times 179$	$7 \times 54$
316 = $2 \times 158$	338 = $2 \times 169$	359 Prime	$9 \times 42$
$4 \times 79$	$13 \times 26$	360 = $2 \times 180$	$14 \times 27$
317 Prime	339 = $3 \times 113$	$3 \times 120$	$18 \times 21$
318 = $2 \times 159$	340 = $2 \times 170$	$4 \times 90$	379 Prime
$3 \times 106$	$4 \times 85$	$5 \times 72$	380 = $2 \times 190$
$6 \times 53$	$5 \times 68$	$6 \times 60$	$4 \times 95$
319 = $11 \times 29$	$10 \times 34$	$8 \times 45$	$5 \times 76$
320 = $2 \times 160$	$17 \times 20$	$9 \times 40$	$10 \times 38$
$4 \times 80$	341 = $11 \times 31$	$10 \times 36$	$19 \times 20$
$5 \times 64$	342 = $2 \times 171$	$12 \times 30$	381 = $3 \times 127$
$8 \times 40$	$3 \times 114$	$15 \times 24$	382 = $2 \times 191$
$10 \times 32$	$6 \times 57$	$18 \times 20$	383 Prime
$16 \times 20$	$9 \times 38$	361 = $19 \times 19$	384 = $2 \times 192$
321 = $3 \times 107$	$18 \times 19$	362 = $2 \times 181$	$3 \times 128$
322 = $2 \times 161$	343 = $7 \times 49$	363 = $3 \times 121$	$4 \times 96$
$7 \times 46$	344 = $2 \times 172$	$11 \times 33$	$6 \times 64$
$14 \times 23$	$4 \times 86$	364 = $2 \times 182$	$8 \times 48$
323 = $17 \times 19$	$8 \times 43$	$4 \times 91$	$12 \times 32$
324 = $2 \times 162$	345 = $3 \times 115$	$7 \times 52$	$16 \times 24$
$3 \times 108$	$5 \times 69$	$13 \times 28$	385 = $5 \times 77$
$4 \times 81$	$15 \times 23$	$14 \times 26$	$7 \times 55$
$6 \times 54$	346 = $2 \times 173$	365 = $5 \times 73$	$11 \times 35$
$9 \times 36$	347 Prime	366 = $2 \times 183$	386 = $2 \times 193$
$12 \times 27$		$3 \times 122$	387 = $3 \times 129$
$18 \times 18$		$6 \times 61$	$9 \times 43$
325 = $5 \times 65$		367 Prime	388 = $2 \times 194$
$13 \times 25$			$4 \times 97$

Table IV (Continued)

389 Prime	408 = 2 × 204	429 = 3 × 143	448 = 2 × 224
390 = 2 × 195	3 × 136	11 × 39	4 × 112
3 × 130	4 × 102	13 × 33	7 × 64
5 × 78	6 × 68	430 = 2 × 215	8 × 56
6 × 65	8 × 51	5 × 86	14 × 32
10 × 39	12 × 34	10 × 43	16 × 28
13 × 30	17 × 24	431 Prime	449 Prime
15 × 26	409 Prime	432 = 2 × 216	450 = 2 × 225
391 = 17 × 23	410 = 2 × 205	3 × 144	3 × 150
392 = 2 × 196	5 × 82	4 × 108	5 × 90
4 × 98	10 × 41	6 × 72	6 × 75
7 × 56	411 = 3 × 137	8 × 54	9 × 50
8 × 49	412 = 2 × 206	9 × 48	10 × 45
14 × 28	4 × 103	12 × 36	15 × 30
393 = 3 × 131	413 = 7 × 59	16 × 27	18 × 25
394 = 2 × 197	414 = 2 × 207	18 × 24	451 = 11 × 41
395 = 5 × 79	3 × 138	433 Prime	452 = 2 × 226
396 = 2 × 198	6 × 69	434 = 2 × 217	4 × 113
3 × 132	9 × 46	7 × 62	453 = 3 × 151
4 × 99	18 × 23	14 × 31	454 = 2 × 227
6 × 66	415 = 5 × 83	435 = 3 × 145	455 = 5 × 91
9 × 44	416 = 2 × 208	5 × 87	7 × 65
11 × 36	4 × 104	15 × 29	13 × 35
12 × 33	8 × 52	436 = 2 × 218	456 = 2 × 228
18 × 22	13 × 32	4 × 109	3 × 152
397 Prime	16 × 26	437 = 19 × 23	4 × 114
398 = 2 × 199	417 = 3 × 139	438 = 2 × 219	6 × 76
399 = 3 × 133	418 = 2 × 109	3 × 146	8 × 57
7 × 57	11 × 38	6 × 73	12 × 38
19 × 21	19 × 22	439 Prime	19 × 24
400 = 2 × 200	419 Prime	440 = 2 × 220	457 Prime
4 × 100	420 = 2 × 210	4 × 110	458 = 2 × 229
5 × 80	3 × 140	5 × 88	459 = 3 × 153
8 × 50	4 × 105	8 × 55	9 × 51
10 × 40	5 × 84	10 × 44	17 × 27
16 × 25	6 × 70	11 × 40	460 = 2 × 230
20 × 20	7 × 60	20 × 22	4 × 115
401 Prime	10 × 42	441 = 3 × 147	5 × 92
402 = 2 × 201	12 × 35	7 × 63	10 × 46
3 × 134	14 × 30	9 × 49	20 × 23
6 × 67	15 × 28	21 × 21	461 Prime
403 = 13 × 31	20 × 21	442 = 2 × 221	462 = 2 × 231
404 = 2 × 202	421 Prime	13 × 34	3 × 154
4 × 101	422 = 2 × 211	17 × 26	6 × 77
405 = 3 × 135	423 = 3 × 141	443 Prime	7 × 66
5 × 81	9 × 47	444 = 2 × 222	11 × 42
9 × 45	424 = 2 × 212	3 × 148	14 × 33
15 × 27	4 × 106	4 × 111	21 × 22
406 = 2 × 203	8 × 53	6 × 74	463 Prime
7 × 58	425 = 5 × 85	12 × 37	464 = 2 × 232
14 × 29	17 × 25	445 = 5 × 89	4 × 116
407 = 11 × 37	426 = 2 × 213	446 = 2 × 223	8 × 58
	3 × 142	447 = 3 × 149	16 × 29
	6 × 71		465 = 3 × 155
	427 = 7 × 61		5 × 93
	428 = 2 × 214		15 × 31
	4 × 107		466 = 2 × 233

Table IV (Continued)

467 Prime	486 = 2 × 243	504 = 2 × 252	522 = 2 × 261
468 = 2 × 234	3 × 162	3 × 168	3 × 174
3 × 156	6 × 81	4 × 126	6 × 87
4 × 117	9 × 54	6 × 84	9 × 58
6 × 78	18 × 27	7 × 72	18 × 29
9 × 52	487 Prime	8 × 63	523 Prime
12 × 39	488 = 2 × 244	9 × 56	524 = 2 × 262
13 × 36	4 × 122	12 × 42	4 × 131
18 × 26	8 × 61	14 × 36	525 = 3 × 175
469 = 7 × 67	489 = 3 × 163	18 × 28	5 × 105
470 = 2 × 235	490 = 2 × 245	21 × 24	7 × 75
5 × 94	5 × 98	505 = 5 × 101	15 × 35
10 × 47	7 × 70	506 = 2 × 253	21 × 25
471 = 3 × 157	10 × 49	11 × 46	526 = 2 × 263
472 = 2 × 236	14 × 35	22 × 23	527 = 17 × 31
4 × 118	491 Prime	507 = 3 × 169	528 = 2 × 264
8 × 59	492 = 2 × 246	13 × 39	3 × 176
473 = 11 × 43	3 × 164	508 = 2 × 254	4 × 132
474 = 2 × 237	4 × 123	4 × 127	6 × 88
3 × 158	6 × 82	509 Prime	8 × 66
6 × 79	12 × 41	510 = 2 × 255	11 × 48
475 = 5 × 95	493 = 17 × 29	3 × 170	12 × 44
19 × 25	494 = 2 × 247	5 × 102	16 × 33
476 = 2 × 238	13 × 38	6 × 85	22 × 24
4 × 119	19 × 26	10 × 51	529 = 23 × 23
7 × 68	495 = 3 × 165	15 × 34	530 = 2 × 265
14 × 34	5 × 99	17 × 30	5 × 106
17 × 28	9 × 55	511 = 7 × 73	10 × 53
477 = 3 × 159	11 × 45	512 = 2 × 256	531 = 3 × 177
9 × 53	15 × 33	4 × 128	9 × 59
478 = 2 × 238	496 = 2 × 298	8 × 64	532 = 2 × 266
479 Prime	4 × 124	16 × 32	4 × 133
480 = 2 × 240	8 × 62	513 = 3 × 171	7 × 76
3 × 160	16 × 31	9 × 57	14 × 38
4 × 120	497 = 7 × 71	19 × 27	19 × 28
5 × 96	498 = 2 × 299	514 = 2 × 257	533 = 13 × 41
6 × 80	3 × 166	515 = 5 × 103	534 = 2 × 267
8 × 60	6 × 83	516 = 2 × 258	3 × 178
10 × 48	499 Prime	3 × 172	6 × 89
12 × 40	500 = 2 × 250	4 × 129	535 = 5 × 107
15 × 32	4 × 125	6 × 86	536 = 2 × 268
16 × 30	5 × 100	12 × 43	4 × 134
20 × 24	10 × 50	517 = 11 × 47	8 × 67
481 = 13 × 37	20 × 25	518 = 2 × 259	537 = 3 × 179
482 = 2 × 241	501 = 3 × 167	7 × 74	538 = 2 × 269
483 = 3 × 161	502 = 2 × 251	14 × 37	539 = 7 × 77
7 × 69	503 Prime	519 = 3 × 173	11 × 49
21 × 23		520 = 2 × 260	
484 = 2 × 242		4 × 130	
4 × 121		5 × 104	
11 × 44		8 × 65	
22 × 22		10 × 52	
485 = 5 × 97		13 × 40	
		20 × 26	
		521 Prime	

Table IV (Continued)

540 = 2 × 270	558 = 2 × 279	576 = 2 × 288	594 = 2 × 297
3 × 180	3 × 186	3 × 192	3 × 198
4 × 135	6 × 93	4 × 144	6 × 99
5 × 108	9 × 62	6 × 96	9 × 66
6 × 90	18 × 31	8 × 72	11 × 54
9 × 60	559 = 13 × 43	9 × 64	18 × 33
10 × 54	560 = 2 × 280	12 × 48	22 × 27
12 × 45	4 × 140	16 × 36	595 = 5 × 119
15 × 36	5 × 112	18 × 32	7 × 85
18 × 30	7 × 80	24 × 24	17 × 35
20 × 27	8 × 70	577 Prime	596 = 2 × 298
541 Prime	10 × 56	578 = 2 × 289	4 × 149
542 = 2 × 271	14 × 40	17 × 34	597 = 3 × 199
543 = 3 × 181	16 × 35	579 = 3 × 193	598 = 2 × 299
544 = 2 × 272	20 × 28	580 = 2 × 290	13 × 46
4 × 136	561 = 3 × 187	4 × 145	23 × 26
8 × 68	11 × 51	5 × 116	599 Prime
16 × 34	17 × 33	10 × 58	600 = 2 × 300
17 × 32	562 = 2 × 281	20 × 29	3 × 200
545 = 5 × 109	563 Prime	581 = 7 × 83	4 × 150
546 = 2 × 273	564 = 2 × 282	582 = 2 × 291	5 × 120
3 × 182	3 × 188	3 × 194	6 × 100
6 × 91	4 × 141	6 × 97	8 × 75
7 × 78	6 × 94	583 = 11 × 53	10 × 60
13 × 42	12 × 47	584 = 2 × 292	12 × 50
14 × 39	565 = 5 × 113	4 × 146	15 × 40
21 × 26	566 = 2 × 283	8 × 73	20 × 30
547 Prime	567 = 3 × 189	585 = 3 × 195	24 × 25
548 = 2 × 274	7 × 81	5 × 117	601 Prime
4 × 137	9 × 63	9 × 65	602 = 2 × 301
549 = 3 × 183	21 × 27	13 × 45	7 × 86
9 × 61	568 = 2 × 284	15 × 39	14 × 43
550 = 2 × 275	4 × 142	586 = 2 × 293	603 = 3 × 201
5 × 110	8 × 71	587 Prime	9 × 67
10 × 55	569 Prime	588 = 2 × 294	604 = 2 × 302
11 × 50	570 = 2 × 285	3 × 196	4 × 151
22 × 25	3 × 190	4 × 147	605 = 5 × 121
551 = 19 × 29	5 × 114	6 × 98	11 × 55
552 = 2 × 276	6 × 95	7 × 84	606 = 2 × 303
3 × 184	10 × 57	12 × 49	3 × 202
4 × 138	15 × 38	14 × 42	6 × 101
6 × 92	19 × 30	21 × 28	607 Prime
8 × 69	571 Prime	589 = 19 × 31	608 = 2 × 304
12 × 46	572 = 2 × 286	590 = 2 × 295	1 × 152
23 × 24	4 × 143	5 × 118	8 × 76
553 = 7 × 79	11 × 52	10 × 59	16 × 38
554 = 2 × 277	13 × 44	591 = 3 × 197	19 × 32
555 = 3 × 185	22 × 26	592 = 2 × 296	609 = 3 × 203
5 × 111	573 = 3 × 191	4 × 148	7 × 87
15 × 37	574 = 2 × 287	8 × 74	21 × 29
556 = 2 × 278	7 × 82	16 × 37	610 = 2 × 305
4 × 139	14 × 41	593 Prime	5 × 122
557 Prime	575 = 5 × 115		10 × 61
	23 × 25		611 = 13 × 47

Table IV (Concluded)

612 = 2 × 306	616 = 2 × 308	619 Prime	624 = 2 × 312
3 × 204	4 × 154	620 = 2 × 310	3 × 208
4 × 152	7 × 88	4 × 155	4 × 156
6 × 102	8 × 77	5 × 124	6 × 104
9 × 68	11 × 56	10 × 62	8 × 78
12 × 51	14 × 44	20 × 31	12 × 52
17 × 36	22 × 28	621 = 3 × 207	13 × 48
18 × 34	617 Prime	9 × 69	16 × 39
613 Prime	618 = 2 × 309	23 × 27	24 × 26
614 = 2 × 307	3 × 206	622 = 2 × 311	625 = 5 × 125
615 = 3 × 205	6 × 103	623 = 7 × 89	25 × 25
5 × 123			
15 × 41			



# ANSWERS

The references at the head of each section are to the numbers of the exercises.

No. 1				
	30	70	69	53
	86	54	25	109
1. 32	42	110	81	65
2. 30	98	66	37	21
3. 29	26	22	93	77
4. 29	82	78	49	40
5. 29	38	34	105	96
6. 31	94	90	68	52
7. 31	50	53	24	108
8. 18	106	109	80	64
9. 37	62	65	36	48
10. 31	25	21	92	104
11. 25	81	77	20	60
12. 35	37	61	76	16
13. 34	93	17	32	72
14. 29	49	73	88	28
15. 26	105	29	44	84
16. 25	33	85	100	47
17. 30	89	41	56	103
18. 33	45	97	19	59
19. 27	101	60	75	15
20. 30	57	16	31	71
21. 33	13	72	87	55
22. 26	69	28	43	111
23. 28	32	84	99	67
24. 27	88		27	23
	44		83	79
	100	No. 3	39	35
No. 2	56		95	91
	40	1. 59	51	54
12	96	2. 51	107	110
68	52	3. 56	63	66
24	108	4. 70	26	22
80	64	5. 62	82	78
36	20	6. 55	38	62
92	76	7. 57	94	18
48	39	8. 59	50	74
104	95	9. 53	106	30
67	51	10. 51	34	86
23	107	11. 69	90	42
79	63	12. 58	46	98
35	47	13. 60	102	61
91	103	14. 65	58	17
19	59	15. 59	14	73
75	15	16. 61	70	29
31	71	17. 53	33	85
87	27	18. 53	89	
43	83		45	
99	46		101	No. 5
55	102	No. 4	57	
18	58		41	14
74	14	13	97	70

26	109	46	113	29
82	65	102	69	85
38	49	58	25	41
94	105	21	81	97
50	61	77	37	53
106	17	33	93	109
69	73	89	56	37
25	29	45	112	93
81	85	101	68	49
37	48	29	24	105
93	104	85	80	61
21	60	41	64	17
77	16	97	20	73
33	72	53	76	36
89	56	109	32	92
45	112	65	88	48
101	68	28	44	104
57	24	84	100	60
20	80	40	63	44
76	36	96	19	100
32	92	52	75	56
88	55	108	31	112
44	111	36	87	68
100	67	92	No. 7	24
28	23	48		80
84	79	104	16	43
40	63	60	72	99
96	19	16	28	55
52	75	72	84	111
108	31	35	40	67
64	87	91	96	51
27	43	47	52	107
83	99	103	108	63
39	62	59	71	19
95	18	43	27	75
51	74	99	83	31
107	30	55	39	87
35	86	111	95	50
91	No. 6	67	23	106
47		23	79	62
103	15	79	35	18
59	71	42	91	74
15	27	98	47	58
71	83	54	103	114
34	39	110	59	70
90	95	66	22	26
46	51	50	78	82
102	107	106	34	38
58	70	62	90	94
42	26	18	46	57
98	82	74	102	113
54	38	30	30	69
110	94	86	86	25
66	22	49	42	81
22	78	105	98	65
78	34	61	54	21
41	90	17	110	77
97		73	66	33
53		57		89

45	37	30	113	98
101	93	86	69	26
64	49	42	53	82
20	105	98	109	38
76	61	54	65	94
32	45	110	21	50
88	101	73	77	106
	57	29	33	62
<b>No. 8</b>	113	85	89	25
<i>(Same as</i>	69	41	52	81
<i>No. 1)</i>	25	97	108	37
	81	25	64	93
<b>No. 9</b>	44	81	20	49
17	100	37	76	105
73	56	93	60	33
29	112	49	116	89
85	68	105	72	45
41	52	61	28	101
97	108	24	84	57
53	64	80	40	113
109	20	36	96	69
72	76	92	59	32
28	32	48	115	88
84	88	104	71	44
40	51	32	27	100
96	107	88	83	56
24	63	44	67	112
80	19	100	23	40
36	75	56	79	96
92	59	112	35	52
48	115	68	91	108
104	71	31	47	64
60	27	87	103	20
23	83	43	66	76
79	39	99	22	39
35	95	55	78	95
91	58	111	34	51
47	114	39	90	107
103	70	95		63
31	26	51	<b>No. 11</b>	47
87	82	107		103
43	66	63	<i>(Same as</i>	59
99	22	19	<i>No. 3)</i>	115
55	78	75		71
111	34	38	<b>No. 12</b>	27
67	90	94		83
30	46	50	19	46
86	102	106	75	102
42	65	62	31	58
98	21	46	87	114
54	77	102	43	70
110	33	58	99	54
38	89	114	55	110
94		70	111	66
50		26	74	22
106	<b>No. 10</b>	82	30	78
62		45	86	34
18	18	101	42	90
74	74	57		53

109	No. 14	84	14. 656	61
65		47	15. 858	117
21	20	103		73
77	76	59	No. 16	29
61	32	115		85
117	88	71	21	48
73	44	55	77	104
29	100	111	33	60
85	56	67	89	116
41	112	23	45	72
97	75	79	101	56
60	31	35	57	112
116	87	91	113	68
72	43	54	76	24
28	99	110	32	80
84	27	66	88	36
68	83	22	44	92
24	39	78	100	55
80	95	62	28	111
36	51	118	84	67
92	107	74	40	23
48	63	30	96	79
104	26	86	52	63
67	82	42	108	119
23	38	98	64	75
79	94	61	27	31
35	50	117	83	87
91	106	73	39	43
	34	29	95	99
	90	85	51	62
	46	69	107	118
No. 13	102	25	35	74
	58	81	91	30
1. 365	114	37	47	86
2. 268	70	93	103	70
3. 371	33	49	59	26
4. 433	89	105	115	82
5. 257	45	68	71	38
6. 327	101	24	34	94
7. 209	57	80	90	50
8. 270	113	36	46	106
9. 287	41	92	102	69
10. 410	97		58	25
11. 257	53	No. 15	114	81
12. 404	109		42	37
13. 231	65	1. 620	98	93
14. 217	21	2. 777	54	
15. 311	77	3. 716	110	No. 17
16. 303	40	4. 562	66	
17. 254	96	5. 432	22	1. 1059
18. 237	52	6. 590	78	2. 1055
19. 308	108	7. 624	41	3. 903
20. 343	64	8. 716	97	4. 963
21. 350	48	9. 885	53	5. 897
22. 360	104	10. 828	109	6. 1113
23. 308	60	11. 424	65	7. 1067
24. 271	116	12. 592	49	8. 759
25. 341	72	13. 535	105	9. 994
	28			

10. 932	118	11. 7	93	88
	74	12. 34	49	72
No. 18	30	13. 52	105	28
	86	14. 11	61	84
	49	15. 52	117	40
22	105		73	96
78	61	No. 20	36	52
34	117		92	108
90	73	1. 28	48	71
46	57	2. 28	104	27
102	113	3. 12	60	83
58	69	4. 19	116	39
114	25	5. 15	44	95
77	81	6. 26	100	
33	37	7. 19	56	
89	93	8. 18	112	No. 22
45	56	9. 48	68	
101	112	10. 21	24	1. 294
29	68	11. 39	80	2. 234
85	24	12. 17	43	3. 414
41	80	13. 26	99	4. 358
97	64	14. 58	55	5. 379
53	120	15. 28	111	6. 381
109	76	16. 18	67	7. 370
65	32	17. 29	51	8. 347
28	88	18. 19	107	9. 221
84	44	19. 29	63	10. 374
40	100		119	
96	63	No. 21	75	
52	119		31	
108	75	23	87	
36	31	79	50	No. 23
92	87	35	106	
48	71	91	62	
104	27	47	118	1. 521
60	83	103	74	2. 213
116	39	59	58	3. 233
72	95	115	114	4. 321
35	51	78	70	5. 331
91	107	34	26	6. 313
47	70	90	82	7. 252
103	26	46	38	8. 412
59	82	102	94	9. 212
115	38	30	57	10. 130
43	94	86	113	11. 122
99		42	69	12. 441
55		98	25	13. 432
111	No. 19	54	81	14. 351
67	1. 12	110	65	15. 221
23	2. 34	66	121	
79	3. 21	29	77	
42	4. 56	85	33	No. 24
98	5. 33	41	89	
54	6. 78	97	45	24
110	7. 12	53	64	80
66	8. 13	109	120	36
50	9. 12	37	76	92
106	10. 21		32	48
62				

104	115	31	91	22. 437
60	71	87	47	23. 722
116	27	43	103	24. 109
79	83	99	66	25. 515
35	39	55	122	26. 209
91	95	111	78	27. 336
47	58	39	34	28. 107
103	114	95	90	29. 868
31	70	51	74	30. 419
87	26	107	30	
43	82	63	86	
99	66	119	42	
55	122	75	98	No. 28
111	78	38	54	26
67	34	94	110	82
30	90	50	73	38
86	46	106	29	94
42	102	62	85	50
98	65	118	41	106
54	121	46	97	62
110	77	102		118
38	33	58		81
94	89	114	No. 26	37
50	73	70		93
106	29	26	1. \$655.71	49
62	85	82	2. \$751.32	105
118	41	45	3. \$604.24	33
74	97	101	4. \$577.21	89
37	53	57	5. \$718.69	45
93	109	113	6. \$769.64	101
49	72	69	7. \$488.04	57
105	28	53	8. \$691.93	113
61	84	109		69
117	40	65		32
45	96	121		88
101		77	No. 27	44
57		33		100
113	No. 25	89	1. 215	56
69		52	2. 415	112
25	25	108	3. 209	40
81	81	64	4. 329	96
44	37	120	5. 778	52
100	93	76	6. 109	108
56	49	60	7. 214	64
112	105	116	8. 248	120
68	61	72	9. 128	76
52	117	28	10. 237	39
108	80	84	11. 403	95
64	36	40	12. 106	51
120	92	96	13. 125	107
76	48	59	14. 125	63
32	104	115	15. 136	119
88	32	71	16. 204	47
51	88	27	17. 109	103
107	44	83	18. 143	59
63	100	67	19. 107	115
119	56	123	20. 308	71
75	112	79	21. 309	27
59	68	35		

83	83	110	35	118
46	39	66	91	74
102	95	122	47	30
58	51	78	103	86
114	107	62	59	70
70	63	118	115	126
54	119	74	71	82
110	82	30	34	38
66	38	86	90	94
122	94	42	46	50
78	50	98	102	106
34	106	61	58	69
90	34	117	114	125
53	90	73	42	81
109	46	29	98	37
65	102	85	54	93
121	58	69	110	79
77	114	125	66	33
61	70	81	112	89
117	33	37	78	45
73	89	93	41	101
29	45	49	97	57
85	101	105	53	113
41	57	68	109	76
97	113	124	65	32
60	41	80	121	88
116	97	36	49	44
72	53	92	105	100
28	109	76	61	
84	65	32	117	
68	121	88	73	
124	77	44	29	No. 31
80	40	100	85	1. 621
36	96	56	48	2. 585
92	52	112	104	3. 687
48	108	75	60	4. 647
104	54	31	116	5. 630
67	120	86	72	6. 605
123	48	43	56	7. 570
79	104	99	112	8. 671
35	60		68	9. 625
91	116		124	10. 624
75	72	No. 30	80	
31	28	28	36	
87	84	84	92	
43	47	40	55	
99	103	96	111	No. 32
55	59	52	67	1. 161
111	115	108	123	2. 292
74	71	64	79	3. 71
30	55	120	63	4. 191
86	111	83	119	5. 171
42	67	39	75	6. 64
98	123	95	31	7. 252
	79	51	87	8. 197
No. 29	35	107	43	9. 623
	91		99	10. 284
27	64		62	

11. 94
12. 387
13. 170
14. 61
15. 593
16. 195
17. 394
18. 295
19. 492
20. 681

**No. 33**

1. 465
2. 579
3. 164
4. 186
5. 153
6. 48
7. 489
8. 186
9. 488
10. 377
11. 329
12. 469
13. 288
14. 56
15. 216
16. 184
17. 249
18. 77
19. 289
20. 169

**No. 34**

1. \$995.69
2. \$1044.85
3. \$954.07
4. \$1002.63
5. \$994.32
6. \$897.80
7. \$1122.66
8. \$1051.42

**No. 35**

1. 395
2. 297
3. 92
4. 299
5. 298
6. 195
7. 298
8. 399
9. 494

10. 497
11. 296
12. 94
13. 495
14. 294
15. 299
16. 198
17. 197
18. 397
19. 293
20. 692
21. 198
22. 294
23. 596
24. 99
25. 395

**No. 36**

1. 985
2. 987
3. 975
4. 1008
5. 953
6. 1011
7. 1042
8. 1032
9. 1095
10. 1012

**No. 37**

1. 347
2. 189
3. 349
4. 78
5. 107
6. 259
7. 189
8. 119
9. 66
10. 88
11. 215
12. 178
13. 178
14. 9
15. 227
16. 109
17. 114
18. 249
19. 234
20. 29
21. 298
22. 284
23. 38
24. 376
25. 129

**No. 38**

1. \$42357.49
2. \$57112.34
3. \$54738.19
4. \$62369.15
5. \$70468.35
6. \$63801.69

**No. 39**

1. \$4.35
2. \$5.59
3. \$ .94
4. \$1.48
5. \$6.92
6. \$7.63
7. \$2.31
8. \$6.84
9. \$3.70
10. \$2.76
11. \$2.29
12. \$6.76
13. \$3.59
14. \$5.96
15. \$1.56
16. \$3.89
17. \$2.68
18. \$6.92
19. \$3.49
20. \$5.97

**No. 40**

(Same as  
No. 13)

**No. 41**

1. \$95513.02
2. \$102635.78
3. \$98506.46
4. \$117398.69
5. \$95153.78
6. \$99073.91

**No. 42**

(Same as  
No. 39)

**No. 43**

1. \$ .93
2. \$1.20

3. \$2.81
4. \$ .65
5. \$1.96
6. \$5.84
7. \$2.95
8. \$1.65
9. \$2.24
10. \$ .71
11. \$1.89
12. \$ .73
13. \$1.23
14. \$1.63
15. \$1.71
16. \$2.48
17. \$1.86
18. \$1.94
19. \$2.45
20. \$1.63

**No. 44**

(Same as  
No. 43)

**No. 45**

- 2
- 114
- 26
- 138
- 50
- 162
- 74
- 186
- 112
- 24
- 136
- 48
- 160
- 16
- 128
- 40
- 152
- 64
- 176
- 88
- 14
- 126
- 38
- 150
- 62
- 174
- 30
- 142
- 54
- 166
- 78



190	124	174	228	336
102	36	63	52	160
28	148	231	276	384
140	60	99	100	208
52	172	267	324	144
164	98	135	148	368
76	10	87	372	192
188	122	255	224	16
44	34	123	48	240
156	146	291	272	64
68		159	96	288
180		27	320	140
92	<b>No. 46</b>	195	32	364
4	3	84	256	188
116	171	252	80	12
42	39	120	304	236
154	207	288	128	172
66	75	156	352	396
178	243	108	176	220
90	111	276	28	44
58	279	144	252	268
170	168	12	76	92
82	36	180	300	316
194	204	48	124	168
106	72	216	348	392
18	240	105	60	216
130	24	273	284	40
56	192	141	108	264
168	60	9	332	200
80	228	177	156	24
192	96	129	380	248
104	264	297	204	72
72	132	165	56	292
184	21	33	280	120
96	189	201	104	344
8	57	69	328	196
120	225	237	152	20
32	93	126	376	244
144	261	294	88	68
70	45	162	312	296
182	213	30	136	
94	81	198	360	
6	249	150	184	<b>No. 48</b>
118	117	18	8	
86	285	186	232	1. \$3433540.07
198	153	54	84	2. \$2509179.07
110	42	222	308	3. \$3688667.60
22	210	90	132	4. \$3251326.81
134	78	258	356	5. \$3449296.55
46	246	147	180	6. \$3353169.99
158	114	15	116	
84	282	183	340	
196	66	51	164	<b>No. 49</b>
108	234	219	388	
20	102		212	1. \$18.53
132	270	<b>No. 47</b>	36	2. \$25.66
100	138	4	260	3. \$23.95
12	6		112	4. \$14.78

5. \$41.76	170	No. 51	174	259
6. \$38.38	450		510	651
7. \$15.74	230	(Same as	246	392
8. \$42.95	10	No. 49)	582	84
9. \$60.76	290		318	476
10. \$71.19	105	No. 52	54	168
11. \$66.57	385		390	560
12. \$59.85	165	6	168	56
13. \$93.72	445	342	504	448
14. \$80.90	225	78	240	140
15. \$75.68	145	414	576	532
16. \$61.52	425	150	312	224
	205	486	216	616
	485	222	552	308
	265	558	288	49
No. 50	45	336	24	441
5	325	72	360	133
285	140	408	96	525
65	420	144	432	217
345	200	480	210	609
125	480	48	546	105
405	260	384	282	497
185	180	120	18	189
465	460	456	354	581
280	240	192	258	273
60	20	528	594	665
340	300	264	330	357
120	80	42	66	98
400	360	378	402	490
40	175	114	138	182
320	455	450	474	574
100	235	186	252	266
380	15	522	588	658
160	295	90	324	154
440	215	426	60	546
220	495	162	396	238
35	275	498	300	630
315	55	234	36	322
95	335	570	372	14
375	115	306	108	406
155	395	84	444	147
435	210	420	180	539
75	490	156	516	231
355	270	492	294	623
135	50	228	30	315
415	330	564	366	203
195	250	132	102	595
475	30	468	438	287
255	310	204		679
70	90	540		371
350	370	276	No. 53	63
130	150	12		455
410	430	348	7	196
190	245	126	399	588
470	25	462	91	280
110	305	198	483	672
390	85	534	175	364
	365	270	567	252

644	12. \$55.60	712	No. 59	639
336	13. \$97.15	360		243
28	14. \$73.69	232	1. 795	747
420	15. \$61.63	680	2. 682	351
112	16. \$68.20	328	3. 564	855
504		776	4. 814	459
245		424	5. 598	126
637	No. 56	72	6. 924	630
329		520	7. 810	234
21	8	224	8. 946	738
413	456	672	9. 1032	342
301	104	320	10. 912	846
693	552	768	11. 901	198
385	200	416	12. 621	702
77	648	288	13. 665	306
469	296	736	14. 308	810
161	744	384	15. 962	414
553	448	32	16. 714	18
294	96	480	17. 1008	522
686	544	128	18. 364	189
378	192	576	19. 736	693
70	640	280	20. 782	297
462	64	728	21. 855	801
350	512	376	22. 864	405
42	160	24	23. 865	261
434	608	472	24. 988	765
126	256	344	25. 667	369
518	704	792		873
210	352	440		477
602	56	88	No. 60	81
343	504	536		585
35	152	184	9	252
427	600	632	513	756
119	248	336	117	360
511	696	784	621	864
	120	432	225	468
	568	80	729	324
No. 54	216	528	333	828
1. \$6537136.94	664	400	837	432
2. \$6295852.28	312	48	504	36
3. \$6328194.91	760	496	108	540
4. \$5945296.77	408	144	612	144
	112	592	216	648
	560	240	720	315
	208	688	72	819
No. 55	656	392	572	423
1. \$19.76	304	40	180	27
2. \$18.86	752	488	684	531
3. \$44.51	176	136	288	387
4. \$26.39	624	584	792	891
5. \$41.42	272		396	495
6. \$6.20	720	No. 57	63	99
7. \$12.22	368	(Same as	567	603
8. \$19.63	16	No. 15)	171	207
9. \$87.27	464	No. 58	675	711
10. \$84.51	168	(Same as	279	378
11. \$71.61	616	No. 55)	783	882
	264		135	486

90	374	<b>No. 62</b>	2. \$836.87
594	990		3. \$666.99
450	506	1. \$11230083.55	4. \$829.97
54	22	2. \$10797546.08	5. \$634.22
558	608	3. \$8876665.99	6. \$827.43
162	231	4. \$8230948.08	7. \$857.76
666	847		8. \$527.72
270	363	<b>No. 63</b>	9. \$418.44
774	979		10. \$906.92
441	495	1. \$47.65	11. \$447.71
45	319	2. \$6.21	12. \$586.87
549	935	3. \$79.61	13. \$407.46
153	451	4. \$34.74	14. \$510.63
657	1067	5. \$14.68	15. \$533.62
	583	6. \$27.74	16. \$663.85
<b>No. 61</b>	99	7. \$27.93	
11	715	8. \$21.85	<b>No. 68</b>
627	308	9. \$54.46	(Same as No. 17)
143	924	10. \$13.83	
759	440	11. \$36.49	<b>No. 69</b>
275	1056	12. \$4.46	(Same as No. 67)
891	572	13. \$50.47	
407	396	14. \$8.53	
1023	1012	15. \$27.16	
616	528	16. \$39.87	
132	44		<b>No. 71</b>
748	660	<b>No. 65</b>	1. \$276.69
264	176	(Same as No. 63)	2. \$855.51
880	792		3. \$682.90
88	385	<b>No. 66</b>	4. \$520.36
704	1001	1. 1827	5. \$773.79
220	517	2. 1705	6. \$891.54
836	33	3. 1170	7. \$326.93
352	649	4. 1376	8. \$245.59
968	473	5. 2511	9. \$371.93
484	1089	6. 2624	10. \$471.54
77	605	7. 3772	11. \$386.88
693	121	8. 1200	12. \$330.44
209	737	9. 1537	13. \$878.62
825	253	10. 1235	14. \$696.89
341	869	11. 1408	15. \$770.20
957	462	12. 1428	16. \$674.87
165	1078	13. 1407	
781	594	14. 1408	<b>No. 72</b>
297	110	15. 2016	(Same as No. 22)
913	726	16. 2418	
429	550	17. 3772	
1045	66	18. 1164	<b>No. 73</b>
561	682	19. 2015	1. 755717535
154	198	20. 2592	2. 756410013
770	814		3. 824293224
286	330	<b>No. 67</b>	4. 824985702
902	946	1. \$846.98	
418	539		
1034	55		
242	671		
858	187		
	803		

5. 3674994324
6. 1167178458
7. 1236433047
8. 6091457406
9. 1690209807
10. 1752668607
11. 1511041308
12. 3675686802
13. 1306128921
14. 1031412036
15. 1442533509

## No. 74

1. 1536
2. 4606
3. 2646
4. 1495
5. 5313
6. 3230
7. 7347
8. 4814
9. 4284
10. 1295
11. 6624
12. 1624
13. 1886
14. 3618
15. 5494
16. 3861
17. 3344
18. 8608
19. 1612
20. 2655

## No. 75

(Same as No. 71)

## No. 76

(Same as No. 26)

## No. 77

- 12
- 684
- 156
- 828
- 300
- 972
- 444
- 1116
- 672

- 144
- 816
- 288
- 960
- 96
- 768
- 240
- 912
- 384
- 1056
- 528
- 84
- 756
- 228
- 900
- 372
- 1044
- 180
- 852
- 324
- 996
- 468
- 1140
- 612
- 168
- 840
- 312
- 984
- 456
- 1128
- 264
- 936
- 408
- 1080
- 552
- 24
- 696
- 252
- 924
- 396
- 1068
- 540
- 348
- 1020
- 492
- 1164
- 636
- 108
- 780
- 336
- 1008
- 480
- 1152
- 624
- 432
- 1104
- 576
- 48

- 720
- 192
- 864
- 420
- 1092
- 564
- 36
- 708
- 516
- 1188
- 660
- 132
- 804
- 276
- 948
- 504
- 1176
- 648
- 120
- 792
- 600
- 72
- 744
- 216
- 888
- 360
- 1032
- 588
- 60
- 732
- 204
- 876

## No. 78

(Same as No. 34)

## No. 79

1. \$451.84
2. \$189.86
3. \$343.97
4. \$352.59
5. \$188.21
6. \$145.71
7. \$291.97
8. \$664.63
9. \$136.68
10. \$86.14
11. \$440.45
12. \$221.48
13. \$196.63
14. \$146.23
15. \$586.21
16. \$568.49

## No. 80

1. 17081

2. 13361
3. 25543
4. 22632
5. 37893
6. 34323
7. 52843
8. 45201
9. 68302
10. 62693
11. 19602
12. 12312
13. 77922
14. 33033
15. 25662
16. 12831
17. 16086
18. 20274
19. 22263
20. 47583
21. 44896

## No. 81

1. 123782280
2. 123895704
3. 135014592
4. 135128016
5. 601943392
6. 191177264
7. 202520776
8. 997746448
9. 276846856
10. 287077256
11. 247500064
12. 602056816
13. 213936568
14. 168939488
15. 236278872

## No. 82

(Same as No. 38)

## No. 83

1. \$451.84
2. \$189.86
3. \$343.97
4. \$352.59
5. \$188.21
6. \$145.71
7. \$291.97
8. \$664.63
9. \$136.68
10. \$86.14
11. \$440.45

12. \$221.48  
13. \$196.63  
14. \$146.23  
15. \$586.21  
16. \$568.49

**No. 84**

1. 19584  
2. 23793  
3. 28288  
4. 24466  
5. 17344  
6. 21483  
7. 24208  
8. 21346  
9. 25164  
10. 12691  
11. 17138  
12. 21918  
13. 30702  
14. 36206  
15. 33355  
16. 17199  
17. 27846  
18. 31003  
19. 29120  
20. 33948  
21. 16238

**No. 86**

1. \$95513.02  
2. \$102635.78  
3. \$98506.46  
4. \$117398.69  
5. \$95153.78  
6. \$99073.91

**No. 89**

1. 170810  
2. 133610  
3. 255430  
4. 226320  
5. 378930  
6. 343230  
7. 526430  
8. 452010  
9. 683020  
10. 626930  
11. 196020  
12. 123120  
13. 779220  
14. 330330

15. 256620  
16. 128310  
17. 160860  
18. 202740  
19. 222630  
20. 465830  
21. 448960

**No. 90**

- 13  
741  
169  
897  
325  
1053  
481  
1209  
728  
156  
884  
312  
1040  
104  
832  
260  
988  
416  
1144  
572  
91  
819  
247  
975  
403  
1131  
195  
923  
351  
1079  
507  
1235  
663  
182  
910  
338  
1066  
494  
1222  
286  
1014  
442  
1170  
598  
26  
754  
273

- 1001  
429  
1157  
585  
377  
1105  
533  
1261  
689  
117  
845  
364  
1092  
520  
1248  
676  
468  
1196  
624  
52  
780  
208  
936  
455  
1183  
611  
39  
767  
559  
1287  
715  
143  
871  
299  
1027  
546  
1274  
702  
130  
858  
650  
78  
806  
234  
962  
390  
1118  
637  
65  
793  
221  
949

**No. 91***(Same as No. 48)***No. 93**

1. 195840  
2. 237930  
3. 282880  
4. 244660  
5. 173440  
6. 214830  
7. 242080  
8. 213460  
9. 251640  
10. 126910  
11. 171380  
12. 219180  
13. 307020  
14. 362060  
15. 333550  
16. 171990  
17. 278460  
18. 310030  
19. 291200  
20. 339480  
21. 162380

**No. 94**

1. 135025095  
2. 135148821  
3. 147277608  
4. 147401334  
5. 656616308  
6. 208541386  
7. 220915199  
8. 1088369102  
9. 301992119  
10. 303151719  
11. 269979836  
12. 656740034  
13. 233367857  
14. 184383812  
15. 257739453

**No. 95***(Same as No. 54)***No. 97**

1. 11211  
2. 24642  
3. 40051  
4. 57902  
5. 77691  
6. 92412  
7. 29432

8. 21311  
9. 35742  
10. 52151  
11. 71002  
12. 91791  
13. 25521  
14. 48155  
15. 24442  
16. 49184  
17. 76146  
18. 44844  
19. 37296  
20. 97902  
21. 39693

## No. 99

1. \$11230083.55  
2. \$10797546.08  
3. \$8876665.99  
4. \$8230948.08

## No. 101

1. 36156  
2. 59290  
3. 80618  
4. 22869  
5. 36696  
6. 52624  
7. 71918  
8. 93555  
9. 97856  
10. 103972  
11. 108988  
12. 84058  
13. 103474  
14. 108580  
15. 79165  
16. 57318  
17. 65778  
18. 77744  
19. 91086  
20. 35547  
21. 80690

## No. 103

1. 365  
2. 268  
3. 371  
4. 433  
5. 257  
6. 327  
7. 209  
8. 270

9. 287  
10. 410  
11. 257  
12. 404  
13. 231  
14. 217  
15. 311  
16. 303  
17. 254  
18. 237  
19. 308  
20. 343  
21. 350  
22. 360  
23. 308  
24. 271  
25. 341

## No. 105

1. 116081  
2. 142272  
3. 165481  
4. 107512  
5. 132181  
6. 159372  
7. 156996  
8. 191522  
9. 181692  
10. 217894  
11. 110564  
12. 110940  
13. 121598  
14. 120273  
15. 134316  
16. 120990  
17. 113970  
18. 145262  
19. 122811  
20. 139635  
21. 144284

## No. 106

14  
798  
182  
966  
350  
1134  
518  
1302  
784  
168

952  
336  
1120  
112  
896  
280  
1064  
448  
1232  
616  
98  
882  
266  
1050  
434  
1218  
210  
994  
378  
1162  
546  
1330  
714  
196  
980  
364  
1148  
532  
1316  
308  
1092  
476  
1260  
644  
28  
812  
294  
1078  
462  
1246  
630  
406  
1190  
574  
1358  
742  
126  
910  
392  
1176  
560  
1344  
728  
504  
1288  
672  
56  
840

224  
1008  
490  
1274  
658  
42  
826  
602  
1386  
770  
154  
938  
322  
1106  
588  
1372  
756  
140  
924  
700  
84  
868  
252  
1036  
420  
1204  
686  
70  
854  
238  
1022

## No. 107

(Same as No. 17)

## No. 109

1. 136004  
2. 229024  
3. 268746  
4. 128064  
5. 160446  
6. 236496  
7. 195853  
8. 223096  
9. 368063  
10. 145673  
11. 187146  
12. 305283  
13. 355096  
14. 291014  
15. 348928  
16. 145728  
17. 336414  
18. 395324

19. 430265  
20. 247275  
21. 575276

**No. 110**

1. 146267910  
2. 146401938  
3. 159540624  
4. 159674652  
5. 711289224  
6. 225905508  
7. 239309622  
8. 1178991756  
9. 327137382  
10. 339226182  
11. 292459608  
12. 711423252  
13. 252799146  
14. 199628136  
15. 279200034

**No. 111***(Same as No. 26)***No. 113**

1. 164232  
2. 227238  
3. 301464  
4. 377910  
5. 456576  
6. 497502  
7. 658752  
8. 172104  
9. 243320  
10. 279396  
11. 354252  
12. 427652  
13. 484432  
14. 588078  
15. 671944  
16. 175392  
17. 173514  
18. 257237  
19. 341968  
20. 429525  
21. 519302

**No. 115***(Same as No. 34)***No. 118***(Same as No. 38)***No. 119**

- 15  
855  
195  
1035  
375  
1215  
555  
1395  
840  
180  
1020  
360  
1200  
120  
960  
300  
1140  
480  
1320  
660  
105  
945  
285  
1125  
465  
1305  
225  
1065  
405  
1245  
585  
1425  
765  
210  
1050  
390  
1230  
570  
1410  
330  
1170  
510  
1350  
690  
30  
870  
315  
1155  
495  
1335  
675

**435**

- 1275  
615  
1455  
795  
135  
975  
420  
1260  
600  
1440  
780  
540  
1380  
720  
60  
900  
240  
1080  
525  
1365  
705  
45  
885  
645  
1485  
825  
165  
1005  
345  
1185  
630  
1470  
810  
150  
990  
750  
90  
930  
270  
1110  
450  
1290  
735  
75  
915  
255  
1095

**No. 120***(Same as No. 41)***No. 122***(Same as No. 48)***No. 123**

1. 157510725  
2. 157655055  
3. 171803640  
4. 171947970  
5. 765962140  
6. 243269630  
7. 257704045  
8. 1269714410  
9. 352282645  
10. 365300645  
11. 314939380  
12. 766106470  
13. 272230435  
14. 214972460  
15. 300660615

**No. 124***(Same as No. 54)***No. 126***(Same as No. 62)***No. 128***(Same as No. 38)***No. 131**

- 16  
912  
208  
1104  
400  
1296  
92  
1488  
896  
192  
1088  
384  
1280  
128  
1024  
320  
1216  
512  
1408  
704  
112  
1008



# 170 THE ART OF CALCULATION

304	368	340	51
1200	1264	1292	1003
496	672	544	731
1392	1568	1496	1683
240	864	748	935
1136	160	119	187
432	1056	1071	1139
1328	800	323	391
624	96	1275	1343
1520	992	527	714
816	288	1479	1666
224	1184	255	918
1120	480	1207	170
416	1376	459	1122
1312	784	1411	850
608	80	663	102
1504	976	1615	1054
352	272	867	306
1248	1168	238	1258
544		1190	510
1440		442	1462
736	<b>No. 132</b>	1394	833
32		646	85
928	1. 168753540	1598	1037
336	2. 168908172	374	289
1232	3. 184066656	1326	1241
528	4. 184221288	578	
1424	5. 820635056	1530	
720	6. 260633752	782	<b>No. 141</b>
464	7. 276098468	34	1. 179996355
1360	8. 1360237064	996	2. 180161289
656	9. 377427908	357	3. 196329672
1552	10. 391375108	1309	4. 196494606
848	11. 337419152	561	5. 875307972
144	12. 820789688	1513	6. 277997874
1040	13. 291661724	765	7. 294492891
448	14. 230316784	493	8. 1450859718
1344	15. 322121196	1445	9. 402573171
640		697	10. 417449571
1536		1649	11. 359898924
832	<b>No. 140</b>	901	12. 875472906
576		153	13. 311093013
1472	17	1105	14. 245661108
768	969	476	15. 343581777
64	221	1428	
960	1173	680	<b>No. 148</b>
256	425	1632	18
1152	1377	884	1026
560	629	912	234
1456	1581	1564	1242
752	952	816	450
48	204	68	1458
944	1156	1020	666
688	408	272	1674
1584	1360	1224	1008
880	136	595	
176	1088	1547	
1072		799	

216  
1224  
432  
1440  
144  
1152  
360  
1368  
576  
1584  
792  
126  
1134  
342  
1350  
558  
1566  
270  
1278  
486  
1494  
702  
1710  
918  
252  
1260  
468  
1476  
684  
1692  
396  
1404  
612  
1620  
828  
36  
1044  
378  
1386  
594  
1602  
810  
522  
1530  
738  
1746  
954  
162  
1170  
504  
1512  
720  
1728  
936  
648  
1656  
864  
72

1080  
288  
1296  
630  
1638  
846  
54  
1062  
774  
1782  
990  
198  
1206  
414  
1422  
756  
1764  
972  
180  
1188  
900  
108  
1116  
324  
1332  
540  
1548  
882  
90  
1098  
306  
1314

**No. 149**

1. 191239170
2. 191414406
3. 208592688
4. 208767924
5. 929980808
6. 295361996
7. 312887314
8. 1541482372
9. 427718434
10. 443524034
11. 382378696
12. 930156124
13. 330524302
14. 261005432
15. 365042358

**No. 156**

19  
1083

247  
1311  
475  
1539  
703  
1767  
1064  
228  
1292  
456  
1520  
152  
1216  
380  
1444  
608  
1672  
836  
133  
1197  
361  
1425  
589  
1653  
285  
1349  
513  
1577  
741  
1805  
969  
266  
1330  
494  
1558  
722  
1786  
418  
1482  
646  
1710  
874  
38  
1102  
399  
1463  
627  
1691  
855  
551  
1615  
779  
1843  
1007  
171  
1235  
532  
1596

760  
1824  
988  
684  
1748  
912  
76  
1140  
304  
1368  
665  
1729  
893  
57  
1121  
817  
1881  
1045  
209  
1273  
437  
1501  
798  
1862  
1026  
190  
1254  
950  
114  
1178  
342  
1406  
570  
1634  
931  
95  
1159  
323  
1387

**No. 159**

1. 202481985
2. 202667523
3. 220855704
4. 221041242
5. 984653804
6. 312726118
7. 331281737
8. 1632105026
9. 452863697
10. 469598497
11. 404858468
12. 984839342
13. 349955591
14. 276349756
15. 386502939

# 172 THE ART OF CALCULATION

## No. 165

20	180
1140	1300
260	560
1380	1680
500	800
1620	1920
740	1040
1860	720
1120	1840
240	960
1360	80
480	1200
1600	320
160	1440
1280	700
400	1820
1520	940
640	60
1760	1180
880	860
140	1980
1260	1100
380	220
1500	1340
620	460
1740	1580
300	840
1420	1960
540	1080
1660	200
780	1320
1900	1000
1020	120
280	1240
1400	360
520	1480
1640	600
760	1720
1880	980
440	100
1560	1220
680	340
1800	1460

## No. 166

920	1. 213724800
40	2. 213920640
1160	3. 233118720
420	4. 233314560
1540	5. 1039326720
660	6. 330090240
1780	7. 349676160
900	8. 1722727680
580	9. 478008960
1700	10. 495672960
820	11. 427338240
1940	12. 1039522560
1060	

13. 369386880  
14. 291694080  
15. 407963520

## No. 172

21	1785
1197	861
273	2037
1449	1113
525	189
1701	1365
777	588
1953	1744
1176	840
252	2016
1428	1092
504	756
1680	1932
168	1008
1344	84
420	1260
1596	336
672	1512
1848	735
924	1911
147	987
1323	63
399	1239
1575	903
651	2079
1827	1155
315	231
1491	1407
567	483
1743	1659
819	882
1995	2058
1071	1134
294	210
1470	1386
546	1050
1722	126
798	1302
1974	378
462	1554
1638	630
714	1806
1890	1029
966	105
42	1281
1218	357
441	1533
1617	
693	
1869	
945	
609	

## No. 173

1. 224967615
2. 225173757
3. 245381736
4. 245587878
5. 1093999636
6. 347454362
7. 368070583

8. 1813350334	462	2. 236426874	506
9. 503154223	1694	3. 257644752	1794
10. 521747423	726	4. 257861196	782
11. 449818012	1958	5. 1148672552	2070
12. 1094205778	990	6. 364818484	1058
13. 388818169	638	7. 386465006	46
14. 307038404	1870	8. 1903972988	1334
15. 429424101	902	9. 528299486	483
	2134	10. 547821886	1771
	1166	11. 472297784	759
No. 179	198	12. 1148888996	2047
22	1430	13. 408249458	1035
1254	616	14. 322382728	667
286	1848	15. 450884682	1955
1518	880		943
550	2112		2231
1782	1144		1219
814	792	No. 186	207
2046	2024		1495
1232	1056	23	644
264	88	1311	1932
1496	1320	299	920
528	352	1587	2208
1760	1584	575	1196
176	770	1863	828
1408	2002	851	2116
440	1034	2139	1104
1672	66	1288	92
704	1298	276	1380
1936	946	1564	368
968	2178	552	1656
154	1210	1840	805
1386	242	184	2093
418	1474	1472	1081
1650	506	460	69
682	1738	1748	1357
1914	924	736	989
330	2156	2024	2277
1562	1188	1012	1265
604	220	161	253
1826	1452	1449	1541
858	1100	437	529
2090	132	1725	1817
1122	1364	713	966
308	396	2001	2254
1540	1628	345	1242
572	660	1623	230
1804	1892	621	1518
836	1078	1909	1150
2068	110	897	138
484	1342	2185	1426
1716	374	1173	414
748	1606	322	1702
1980		1610	690
1012	No. 180	598	1978
44		1886	1127
1276	1. 236210430	874	115
		2162	1403

391	336	1776	1775
1679	1680	720	675
	624	2064	2075
	1968	1176	975
No. 187	912	120	2375
	2256	1464	1275
1. 247453245	528	408	350
2. 247679991	1872	1752	1750
3. 269907768	816		650
4. 270134514	2160		2050
5. 1203345468	1104	No. 194	950
6. 382182606	48		2350
7. 404859429	1392	1. 258696060	550
8. 1994595642	504	2. 258933108	1950
9. 553444749	1848	3. 282170784	850
10. 573896349	792	4. 282407832	2250
11. 494777556	2136	5. 1258018384	1150
12. 1203572214	1080	6. 399546728	50
13. 427680747	696	7. 423253852	1450
14. 337727052	2040	8. 2085218296	525
15. 472345263	984	9. 578590012	1925
	2328	10. 599970812	825
	1272	11. 517257328	2225
No. 193	216	12. 1258255432	1125
	1560	13. 447112036	725
24	672	14. 353071376	2125
1368	2016	15. 493805844	1025
312	960		2425
1656	2304		1325
600	1248	No. 200	225
1944	864		1625
888	2208	25	700
2232	1152	1425	2100
1344	96	325	1000
288	1440	1725	2400
1632	384	625	1300
576	1728	2025	900
1920	840	925	2300
192	2184	2325	1200
1536	1128	1400	100
480	72	300	1500
1824	1416	1700	400
768	1032	600	1800
2112	2376	2000	875
1056	1320	200	2275
168	264	1600	1175
1512	1608	500	75
456	552	1900	1475
1800	1896	800	1075
744	1008	2200	2475
2088	2352	1100	1375
360	1296	175	275
1704	240	1575	1675
648	1584	475	575
1992	1200	1875	1975
936	144	775	1050
2280	1488	2175	2450
1224	432	375	1350

250	No. 219	2. 726	No. 240
1650		3. 1059	
1250	(Annex O to	4. 1392	1. 755
150	Answers to	5. 1713	2. 1310
1550	No. 52)	6. 1896	3. 1865
450		7. 2229	4. 2420
1850	No. 222	8. 2562	5. 2975
750		9. 2883	6. 3280
2150	(Annex O to	10. 516	7. 3805
1225	Answers to	11. 699	8. 4360
125	No. 53)	12. 1032	9. 4915
1525		13. 1353	10. 970
425	No. 226	14. 1686	11. 1275
1825		15. 2019	12. 1830
	(Annex O to	16. 2202	13. 2355
No. 201	Answers to	17. 2523	14. 2910
	No. 56)	18. 2856	15. 3465
1. 269938875	No. 228	19. 489	16. 3770
2. 270186225	(Annex O to	20. 822	17. 4325
3. 294433800	Answers to	No. 236	18. 4880
4. 294681150	No. 60)	(Annex O to	19. 905
5. 1312691300		Answers to	20. 1460
6. 416910850	No. 229	No. 77)	No. 242
7. 441648275			(Annex O to
3. 2175840950	1. 242	No. 237	Answers to
9. 603735275	2. 464		No. 106)
10. 626045275	3. 686	1. 564	No. 243
11. 539737100	4. 902	2. 1008	
12. 1312938650	5. 1124	3. 1452	1. 846
13. 466543325	6. 1246	4. 1896	2. 1512
14. 368415700	7. 1462	5. 2340	3. 2178
15. 515266425	8. 1684	6. 2564	4. 2844
	9. 1906	7. 3008	5. 3510
No. 204	10. 322	8. 3452	6. 4176
(Annex O to	11. 444	9. 3892	7. 4482
Answers to	12. 666	10. 740	8. 5106
No. 45)	13. 882	11. 964	9. 5772
	14. 1104	12. 1408	10. 1038
No. 208	15. 1326	13. 1852	11. 1704
(Annex O to	16. 1442	14. 2296	12. 2370
Answers to	17. 1664	15. 2740	13. 2676
No. 46)	18. 1886	16. 2964	14. 3342
	19. 302	17. 3408	15. 3966
No. 212	20. 524	18. 3852	16. 4632
(Annex O to	No. 232	19. 696	17. 5298
Answers to	(Annex O to	20. 1140	18. 5964
No. 47)	Answers to		19. 870
	No. 61)	No. 239	20. 1536
No. 215	No. 233	(Annex O to	No. 244
(Annex O to		Answers to	(Annex O to
Answers to	1. 393	No. 90)	Answers to
No. 50)			No. 119)

## No. 245

1. 917
2. 1694
3. 2471
4. 3248
5. 4025
6. 4802
7. 5579
8. 5866
9. 6587
10. 1064
11. 1841
12. 2618
13. 3395
14. 4172
15. 4459
16. 5236
17. 5957
18. 6734
19. 1211
20. 1988

## No. 246

(Annex O to  
Answers to  
No. 131)

## No. 247

1. 1128
2. 2016
3. 2904
4. 3792
5. 4680
6. 5568
7. 5976
8. 6864
9. 7752
10. 1368
11. 2256
12. 3144
13. 3552
14. 4440
15. 5328
16. 6216
17. 7104
18. 7992
19. 5928
20. 5216

## No. 248

1.  $\frac{1}{8}, \frac{3}{8}, \frac{5}{8}$

$$2. \frac{1}{16}, \frac{4}{16}, \frac{9}{16}$$

$$3. \frac{1}{8}, \frac{4}{8}, \frac{9}{8}$$

$$4. \frac{1}{12}, \frac{4}{12}, \frac{9}{12}$$

$$5. \frac{1}{24}, \frac{4}{24}, \frac{9}{24}$$

$$6. \frac{1}{10}, \frac{4}{10}, \frac{9}{10}$$

$$7. \frac{1}{20}, \frac{4}{20}, \frac{9}{20}$$

$$8. \frac{1}{40}, \frac{4}{40}, \frac{9}{40}$$

$$9. \frac{1}{80}, \frac{4}{80}, \frac{9}{80}$$

$$10. \frac{1}{160}, \frac{4}{160}, \frac{9}{160}$$

$$11. \frac{1}{320}, \frac{4}{320}, \frac{9}{320}$$

$$12. \frac{1}{640}, \frac{4}{640}, \frac{9}{640}$$

$$13. \frac{1}{1280}, \frac{4}{1280}, \frac{9}{1280}$$

$$14. \frac{1}{2560}, \frac{4}{2560}, \frac{9}{2560}$$

$$15. \frac{1}{5120}, \frac{4}{5120}, \frac{9}{5120}$$

$$16. \frac{1}{10240}, \frac{4}{10240}, \frac{9}{10240}$$

$$17. \frac{1}{20480}, \frac{4}{20480}, \frac{9}{20480}$$

$$18. \frac{1}{40960}, \frac{4}{40960}, \frac{9}{40960}$$

$$19. \frac{1}{81920}, \frac{4}{81920}, \frac{9}{81920}$$

$$20. \frac{1}{163840}, \frac{4}{163840}, \frac{9}{163840}$$

$$21. \frac{1}{327680}, \frac{4}{327680}, \frac{9}{327680}$$

$$22. \frac{1}{655360}, \frac{4}{655360}, \frac{9}{655360}$$

$$23. \frac{1}{1310720}, \frac{4}{1310720}, \frac{9}{1310720}$$

$$24. \frac{1}{2621440}, \frac{4}{2621440}, \frac{9}{2621440}$$

$$19. \frac{1}{16}, \frac{4}{16}, \frac{9}{16}$$

$$20. \frac{1}{32}, \frac{4}{32}, \frac{9}{32}$$

$$21. \frac{1}{64}, \frac{4}{64}, \frac{9}{64}$$

$$22. \frac{1}{128}, \frac{4}{128}, \frac{9}{128}$$

$$23. \frac{1}{256}, \frac{4}{256}, \frac{9}{256}$$

$$24. \frac{1}{512}, \frac{4}{512}, \frac{9}{512}$$

$$25. \frac{1}{1024}, \frac{4}{1024}, \frac{9}{1024}$$

$$26. \frac{1}{2048}, \frac{4}{2048}, \frac{9}{2048}$$

$$27. \frac{1}{4096}, \frac{4}{4096}, \frac{9}{4096}$$

$$28. \frac{1}{8192}, \frac{4}{8192}, \frac{9}{8192}$$

$$29. \frac{1}{16384}, \frac{4}{16384}, \frac{9}{16384}$$

$$30. \frac{1}{32768}, \frac{4}{32768}, \frac{9}{32768}$$

$$31. \frac{1}{65536}, \frac{4}{65536}, \frac{9}{65536}$$

$$32. \frac{1}{131072}, \frac{4}{131072}, \frac{9}{131072}$$

$$33. \frac{1}{262144}, \frac{4}{262144}, \frac{9}{262144}$$

$$34. \frac{1}{524288}, \frac{4}{524288}, \frac{9}{524288}$$

$$35. \frac{1}{1048576}, \frac{4}{1048576}, \frac{9}{1048576}$$

$$36. \frac{1}{2097152}, \frac{4}{2097152}, \frac{9}{2097152}$$

$$37. \frac{1}{4194304}, \frac{4}{4194304}, \frac{9}{4194304}$$

$$38. \frac{1}{8388608}, \frac{4}{8388608}, \frac{9}{8388608}$$

$$39. \frac{1}{16777216}, \frac{4}{16777216}, \frac{9}{16777216}$$

$$40. \frac{1}{33554432}, \frac{4}{33554432}, \frac{9}{33554432}$$

## No. 251

1. 1368
2. 2367
3. 3366
4. 4365
5. 5364
6. 5823
7. 6822
8. 7821
9. 8757
10. 1656
11. 2655
12. 3114
13. 4113
14. 5112
15. 6111
16. 7056
17. 8055
18. 8514
19. 1413
20. 2412

## No. 252

1. 121
2. 232
3. 343
4. 451
5. 562
6. 623
7. 731
8. 842

9. 953
10. 161
11. 222
12. 333
13. 441
14. 552
15. 663
16. 721
17. 832
18. 943
19. 151
20. 262

## No. 253

1.  $\frac{7}{18}$
2.  $\frac{1}{18}$
3.  $\frac{1}{18}$
4.  $\frac{1}{18}$
5.  $\frac{1}{18}$
6.  $\frac{1}{18}$
7.  $\frac{1}{18}$
8.  $\frac{1}{18}$
9.  $\frac{1}{18}$
10.  $\frac{1}{18}$

## No. 254

(Annex O to  
Answers to  
No. 148)

## No. 255

1. 131
2. 242
3. 353
4. 464
5. 571
6. 632
7. 743
8. 854
9. 961
10. 172
11. 233
12. 344
13. 451
14. 562
15. 673
16. 734
17. 841
18. 952
19. 163
20. 274

## No. 256

1.  $1\frac{1}{8}$
2.  $1\frac{1}{8}$
3.  $1\frac{1}{8}$
4.  $1\frac{1}{8}$
5.  $1\frac{1}{8}$
6.  $1\frac{1}{8}$
7.  $1\frac{1}{8}$
8.  $1\frac{1}{8}$
9.  $1\frac{1}{8}$
10.  $1\frac{1}{8}$

## No. 257

(Annex O to  
Answers to  
No. 156)

## No. 258

1. 141
2. 252
3. 363
4. 474
5. 585
6. 641
7. 752
8. 863
9. 974
10. 185
11. 241
12. 352
13. 463
14. 574
15. 685
16. 741
17. 852
18. 963
19. 174
20. 285

## No. 259

1.  $1\frac{7}{8}$
2.  $1\frac{2}{8}$
3.  $1\frac{1}{8}$
4.  $1\frac{1}{8}$
5.  $1\frac{3}{8}$
6.  $1\frac{5}{8}$
7.  $1\frac{7}{8}$
8.  $1\frac{9}{8}$
9.  $1\frac{11}{8}$
10.  $1\frac{13}{8}$

## No. 260

(Annex O to  
Answers to  
No. 165)

## No. 261

1.  $\frac{1}{2}$
2.  $\frac{5}{8}$
3.  $\frac{5}{8}$
4.  $\frac{3}{4}$
5.  $\frac{11}{8}$
6.  $1\frac{1}{4}$
7.  $\frac{3}{4}$
8.  $1\frac{1}{2}$
9.  $1\frac{1}{4}$
10.  $1\frac{1}{2}$

## No. 262

1. 151
2. 262
3. 373
4. 484
5. 595
6. 656
7. 761
8. 872
9. 983
10. 194
11. 255
12. 366
13. 471
14. 582
15. 693
16. 754
17. 865
18. 976
19. 181
20. 292

## No. 263

1.  $\frac{1}{2}$
2.  $\frac{3}{4}$
3.  $\frac{3}{4}$
4.  $\frac{3}{4}$
5.  $\frac{3}{4}$
6.  $\frac{3}{4}$
7.  $\frac{3}{4}$
8.  $\frac{3}{4}$
9.  $\frac{3}{4}$
10.  $\frac{3}{4}$
11.  $\frac{3}{4}$

12.  $\frac{3}{8}$ 13.  $\frac{3}{8}$ 14.  $\frac{3}{8}$ 15.  $\frac{3}{8}$ 16.  $\frac{3}{8}$ 17.  $\frac{3}{8}$ 18.  $\frac{3}{8}$ 19.  $\frac{3}{8}$ 20.  $\frac{3}{8}$ 21.  $\frac{3}{8}$ 22.  $\frac{3}{8}$ 23.  $\frac{3}{8}$ 24.  $\frac{3}{8}$ 25.  $\frac{3}{8}$ 26.  $\frac{3}{8}$ 27.  $\frac{3}{8}$ 28.  $\frac{3}{8}$ 29.  $\frac{3}{8}$ 30.  $\frac{3}{8}$ 

## No. 264

(Annex O to  
Answers to  
No. 172)

## No. 265

1.  $\frac{1}{8}$
2.  $\frac{3}{8}$
3.  $\frac{5}{8}$
4.  $\frac{7}{8}$
5.  $\frac{9}{8}$
6.  $\frac{11}{8}$
7.  $\frac{13}{8}$
8.  $\frac{15}{8}$
9.  $\frac{17}{8}$
10.  $\frac{19}{8}$

## No. 266

1. 141
2. 252
3. 363
4. 474
5. 585
6. 696
7. 747
8. 851
9. 962
10. 173
11. 284
12. 395
13. 446
14. 557

## 15. 661

## 16. 772

## 17. 883

## 18. 994

## 19. 145

## 20. 256

## No. 267

1.  $\frac{1}{2}$
2.  $\frac{7}{8}$
3.  $\frac{3}{4}$
4.  $1\frac{1}{2}$
5.  $1\frac{1}{2}$
6.  $1\frac{1}{2}$
7.  $1\frac{1}{2}$
8.  $1\frac{1}{2}$
9.  $1\frac{1}{2}$
10.  $1\frac{1}{2}$

## No. 268

(Annex O to  
Answers to  
No. 179)

## No. 269

1.  $\frac{5}{8}$
2.  $\frac{7}{8}$
3.  $\frac{9}{8}$
4.  $\frac{11}{8}$
5.  $\frac{13}{8}$
6.  $\frac{15}{8}$
7.  $\frac{17}{8}$
8.  $\frac{19}{8}$
9.  $\frac{21}{8}$
10.  $\frac{23}{8}$

## No. 270

1. 131
2. 242
3. 353
4. 464
5. 575
6. 686
7. 797
8. 838
9. 941
10. 152
11. 263
12. 374
13. 485



14. 596
15. 637
16. 748
17. 851
18. 962
19. 173
20. 284

## No. 271

1.  $\frac{2}{3}$
2.  $1\frac{1}{3}$
3.  $\frac{5}{12}$
4.  $1\frac{1}{2}$
5.  $\frac{1}{2}$
6.  $1\frac{7}{12}$
7.  $\frac{7}{24}$
8.  $\frac{1}{24}$
9.  $\frac{10}{24}$
10.  $1\frac{1}{24}$

## No. 272

(Annex O to  
Answers to  
No. 186)

## No. 273

1.  $\frac{9}{16}$
2.  $\frac{11}{16}$
3.  $\frac{13}{16}$
4.  $\frac{15}{16}$
5.  $\frac{1}{16}$
6.  $\frac{3}{16}$
7.  $\frac{5}{16}$
8.  $\frac{7}{16}$
9.  $\frac{9}{16}$
10.  $\frac{11}{16}$

## No. 274

1. 141
2. 252
3. 363
4. 474
5. 585
6. 696
7. 747
8. 858
9. 969
10. 171
11. 282

12. 393
13. 444
14. 555
15. 666
16. 777
17. 888
18. 999
19. 741
20. 652

## No. 275

1.  $\frac{22}{24}$
2.  $1\frac{5}{24}$
3.  $1\frac{11}{24}$
4.  $1\frac{17}{24}$
5.  $\frac{7}{12}$
6.  $\frac{11}{12}$
7.  $1\frac{1}{12}$
8.  $1\frac{5}{12}$
9.  $\frac{1}{3}$
10.  $\frac{2}{3}$

## No. 276

(Annex O to  
Answers to  
No. 193)

## No. 277

1.  $\frac{13}{16}$
2.  $\frac{15}{16}$
3.  $\frac{1}{16}$
4.  $\frac{3}{16}$
5.  $\frac{5}{16}$
6.  $\frac{7}{16}$
7.  $\frac{9}{16}$
8.  $\frac{11}{16}$
9.  $\frac{13}{16}$
10.  $\frac{15}{16}$

## No. 278

1. 152
2. 263
3. 374
4. 485
5. 596
6. 647
7. 758

8. 869
9. 973
10. 184
11. 295
12. 346
13. 437
14. 568
15. 679
16. 784
17. 895
18. 946
19. 157
20. 268

## No. 279

1.  $\frac{5}{8}$
2.  $1\frac{1}{8}$
3.  $\frac{5}{8}$
4.  $1\frac{1}{8}$
5.  $1\frac{1}{8}$
6.  $1\frac{1}{8}$
7.  $\frac{5}{24}$
8.  $\frac{13}{24}$
9.  $\frac{17}{24}$
10.  $1\frac{1}{24}$

## No. 280

(Annex O to  
Answers to  
No. 200)

## No. 281

1.  $\frac{1}{8}$
2.  $\frac{3}{8}$
3.  $\frac{1}{2}$
4.  $\frac{5}{8}$
5.  $\frac{7}{8}$
6.  $1\frac{1}{8}$
7.  $1\frac{3}{8}$
8.  $1\frac{5}{8}$
9.  $1\frac{7}{8}$
10.  $1\frac{1}{2}$

## No. 282

1. 2r86
2. 2r129
3. 2r108
4. 2r347
5. 2r456
6. 2r589

7. 2r312
8. 2r102
9. 2r208
10. 2r117
11. 3r13
12. 3r50
13. 3r105
14. 3r182
15. 3r285
16. 4r126
17. 4r200
18. 4r252
19. 4r282
20. 4r280

## No. 283

1.  $1\frac{1}{24}$
2.  $1\frac{5}{24}$
3.  $1\frac{9}{24}$
4.  $1\frac{13}{24}$
5.  $1\frac{17}{24}$
6.  $1\frac{21}{24}$
7.  $1\frac{25}{24}$
8.  $1\frac{29}{24}$
9.  $2\frac{1}{24}$
10.  $2\frac{5}{24}$

## No. 284

1. 1066
2. 1377
3. 1708
4. 2059
5. 2511
6. 2912
7. 1023
8. 1394
9. 1326
10. 1647
11. 1988
12. 2349
13. 2821
14. 992
15. 1353
16. 1734
17. 1586
18. 1917
19. 2268
20. 2639

## No. 285

1.  $\frac{1}{12}$
2.  $\frac{5}{12}$
3.  $\frac{7}{12}$

4.  $\frac{11}{12}$
5.  $\frac{1}{12}$
6.  $\frac{5}{12}$
7.  $\frac{7}{12}$
8.  $\frac{11}{12}$
9.  $\frac{1}{12}$
10.  $\frac{1}{12}$

## No. 286

1. 2r1
2. 2r29
3. 2r376
4. 2r551
5. 2r374
6. 3r378
7. 3r518
8. 3r680
9. 3r864
10. 3r17
11. 4r266
12. 4r225
13. 4r172
14. 4r93
15. 4r162
16. 5r90
17. 5r130
18. 5r148
19. 5r144
20. 5r119

## No. 287

1.  $\frac{11}{12}$
2.  $\frac{11}{12}$
3.  $\frac{5}{12}$
4.  $\frac{1}{12}$
5.  $\frac{1}{12}$
6.  $\frac{1}{12}$
7.  $\frac{1}{12}$
8.  $\frac{1}{12}$
9.  $\frac{1}{12}$
10.  $\frac{1}{12}$

## No. 288

1. 1470
2. 1872
3. 2294
4. 2736
5. 3198
6. 3772
7. 1344

8. 1806
9. 1820
10. 2232
11. 2664
12. 3116
13. 3588
14. 1312
15. 1764
16. 2236
17. 2108
18. 2520
19. 2952
20. 3404

## No. 289

1.  $\frac{1}{12}$
2.  $\frac{1}{12}$
3.  $\frac{1}{12}$
4.  $\frac{1}{12}$
5.  $\frac{1}{12}$
6.  $\frac{1}{12}$
7.  $\frac{1}{12}$
8.  $\frac{1}{12}$
9.  $\frac{1}{12}$
10.  $\frac{1}{12}$

## No. 290

1. 2r37
2. 2r771
3. 2r150
4. 2r85
5. 2r99
6. 3r46
7. 3r102
8. 3r170
9. 3r280
10. 3r402
11. 4r192
12. 4r235
13. 4r276
14. 4r285
15. 4r272
16. 5r67
17. 5r693
18. 5r564
19. 5r632
20. 5r97

## No. 291

1.  $\frac{7}{12}$
2.  $\frac{1}{12}$

3.  $\frac{1}{12}$
4.  $\frac{1}{12}$
5.  $\frac{1}{12}$
6.  $\frac{1}{12}$
7.  $\frac{1}{12}$
8.  $\frac{1}{12}$
9.  $\frac{1}{12}$
10.  $\frac{1}{12}$

## No. 292

1. 1892
2. 2385
3. 2898
4. 3431
5. 3984
6. 4557
7. 1683
8. 2236
9. 2332
10. 2835
11. 3358
12. 3901
13. 4464
14. 1617
15. 2193
16. 2756
17. 2772
18. 3510
19. 3818
20. 4371

## No. 293

1.  $\frac{5}{12}$
2.  $\frac{5}{12}$
3.  $\frac{5}{12}$
4.  $\frac{5}{12}$
5.  $\frac{1}{12}$
6.  $\frac{1}{12}$
7.  $\frac{1}{12}$
8.  $\frac{1}{12}$
9.  $\frac{1}{12}$
10.  $\frac{1}{12}$

## No. 294

1. 3r51
2. 3r69
3. 3r95
4. 3r32
5. 3r54
6. 4r226
7. 4r85
8. 4r864

9. 4r119
10. 4r208
11. 5r146
12. 5r288
13. 5r321
14. 5r465
15. 5r108
16. 6r125
17. 6r200
18. 6r77
19. 6r111
20. 6r310

## No. 295

1.  $\frac{1}{12}$
2.  $\frac{1}{12}$
3.  $\frac{1}{12}$
4.  $\frac{1}{12}$
5.  $\frac{1}{12}$
6.  $\frac{1}{12}$
7.  $\frac{1}{12}$
8.  $\frac{1}{12}$
9.  $\frac{1}{12}$
10.  $\frac{1}{12}$

## No. 296

1. 2332
2. 2916
3. 3520
4. 4144
5. 4788
6. 5452
7. 2006
8. 2684
9. 2862
10. 3456
11. 4070
12. 4704
13. 1972
14. 1972
15. 2596
16. 3599
17. 3392
18. 3996
19. 4620
20. 5264

## No. 297

1.  $\frac{7}{12}$
2.  $\frac{1}{12}$
3.  $\frac{1}{12}$
4.  $\frac{1}{12}$

5.  $\frac{7}{12}$
6.  $\frac{1}{12}$
7.  $\frac{1}{12}$
8.  $\frac{8}{12}$
9.  $\frac{7}{12}$
10.  $\frac{11}{12}$

## No. 298

1. 5r219
2. 5r642
3. 5r312
4. 5r97
5. 5r106
6. 6r310
7. 6r150
8. 6r100
9. 6r609
10. 6r115
11. 7r65
12. 7r135
13. 7r235
14. 7r185
15. 7r64
16. 8r72
17. 8r125
18. 8r180
19. 8r360
20. 8r421

## No. 299

1.  $\frac{7}{20}$
2.  $\frac{11}{20}$
3.  $\frac{12}{20}$
4.  $\frac{12}{20}$
5.  $\frac{12}{20}$
6.  $\frac{12}{20}$
7.  $\frac{12}{20}$
8.  $\frac{12}{20}$
9.  $\frac{12}{20}$
10.  $\frac{12}{20}$

## No. 300

1. 2790
2. 3465
3. 4160
4. 4875
5. 5610
6. 6365
7. 2380
8. 3105

9. 3410
10. 4095
11. 4800
12. 5525
13. 6270
14. 2345
15. 3060
16. 3795
17. 4030
18. 4725
19. 5440
20. 6175

## No. 301

1.  $\frac{1}{12}$
2.  $\frac{1}{12}$
3.  $\frac{7}{12}$
4.  $\frac{11}{12}$
5.  $\frac{1}{12}$
6.  $\frac{1}{12}$
7.  $\frac{7}{12}$
8.  $\frac{11}{12}$
9.  $\frac{1}{12}$
10.  $\frac{8}{12}$

## No. 302

1. 6r10
2. 6r29
3. 6r38
4. 6r165
5. 6r651
6. 7r501
7. 7r307
8. 7r799
9. 7r646
10. 7r20
11. 8r189
12. 8r612
13. 8r325
14. 8r486
15. 8r17
16. 9r125
17. 9r135
18. 9r74
19. 9r85
20. 9r59

## No. 303

1.  $\frac{1}{20}$
2.  $\frac{11}{20}$
3.  $\frac{11}{20}$
4.  $\frac{11}{20}$

5.  $\frac{11}{20}$
6.  $\frac{11}{20}$
7.  $\frac{11}{20}$
8.  $\frac{11}{20}$
9.  $\frac{11}{20}$
10.  $\frac{11}{20}$

## No. 304

1. 3266
2. 4032
3. 4818
4. 5624
5. 6450
6. 7296
7. 2772
8. 3588
9. 3976
10. 4752
11. 5548
12. 6364
13. 7200
14. 2736
15. 3542
16. 4368
17. 4686
18. 5472
19. 6278
20. 7104

## No. 305

1.  $\frac{7}{12}$
2.  $\frac{11}{12}$
3.  $\frac{1}{12}$
4.  $\frac{1}{12}$
5.  $\frac{1}{12}$
6.  $\frac{1}{12}$
7.  $\frac{1}{12}$
8.  $\frac{1}{12}$
9.  $\frac{1}{12}$
10.  $\frac{1}{12}$

## No. 306

1. 6r706
2. 6r95
3. 6r37
4. 6r38
5. 6r40
6. 7r18
7. 7r118
8. 7r211
9. 7r346
10. 7r252
11. 8r28
12. 8r39

13. 8r404
14. 8r355
15. 8r626
16. 9r64
17. 9r301
18. 9r400
19. 9r500
20. 9r65

## No. 307

1.  $\frac{22}{40}$
2.  $\frac{21}{40}$
3.  $\frac{21}{40}$
4.  $\frac{17}{40}$
5.  $\frac{18}{40}$
6.  $\frac{21}{40}$
7.  $\frac{18}{40}$
8.  $\frac{11}{40}$
9.  $\frac{21}{40}$
10.  $\frac{17}{40}$

## No. 308

1. 3713
2. 4617
3. 5494
4. 6391
5. 7308
6. 8245
7. 3182
8. 4089
9. 4503
10. 5427
11. 6314
12. 7221
13. 8148
14. 3145
15. 4042
16. 4959
17. 5293
18. 6237
19. 7134
20. 8051

## No. 309

1.  $\frac{1}{10}$
2.  $\frac{8}{10}$
3.  $\frac{7}{10}$
4.  $\frac{1}{10}$
5.  $\frac{1}{10}$
6.  $\frac{8}{10}$
7.  $\frac{7}{10}$
8.  $\frac{1}{10}$

9.  $\frac{1}{2}$   
10.  $\frac{1}{2}$

## No. 310

1. 7r129  
2. 7r642  
3. 7r711  
4. 7r32  
5. 7r232  
6. 8r77  
7. 8r444  
8. 8r312  
9. 8r147  
10. 8r25  
11. 9r27  
12. 9r297  
13. 9r358  
14. 9r555  
15. 9r609  
16. 9r775  
17. 9r862  
18. 9r927  
19. 9r150  
20. 9r215

## No. 311

1.  $1\frac{2}{40}$   
2.  $1\frac{1}{40}$   
3.  $\frac{2}{40}$   
4.  $\frac{2}{40}$   
5.  $1\frac{2}{40}$   
6.  $1\frac{1}{40}$   
7.  $1\frac{2}{40}$   
8.  $1\frac{1}{40}$   
9.  $1\frac{2}{40}$   
10.  $1\frac{1}{40}$

## No. 312

1. 4224  
2. 5162  
3. 6188  
4. 7176  
5. 8184  
6. 9212  
7. 3610  
8. 4608  
9. 5104  
10. 6052  
11. 7098  
12. 8096  
13. 9114  
14. 3572

15. 4560  
16. 5568  
17. 5984  
18. 6942  
19. 8008  
20. 9016

## No. 313

1.  $\frac{2}{40}$   
2.  $\frac{1}{40}$   
3.  $\frac{1}{40}$   
4.  $\frac{2}{40}$   
5.  $\frac{1}{40}$   
6.  $\frac{2}{40}$   
7.  $\frac{1}{40}$   
8.  $\frac{2}{40}$   
9.  $\frac{1}{40}$   
10.  $\frac{2}{40}$

## No. 314

1.  $\frac{2}{40}$   
2.  $1\frac{1}{40}$   
3.  $1\frac{2}{40}$   
4.  $1\frac{1}{40}$   
5.  $\frac{2}{40}$   
6.  $\frac{1}{40}$   
7.  $\frac{1}{40}$   
8.  $1\frac{2}{40}$   
9.  $\frac{1}{40}$   
10.  $\frac{2}{40}$

## No. 315

1. 4655  
2. 5664  
3. 6693  
4. 7742  
5. 8811  
6. 9405  
7. 3744  
8. 4753  
9. 5782  
10. 6831  
11. 7505  
12. 8544  
13. 9603  
14. 3822  
15. 4851  
16. 5605  
17. 6624  
18. 7663  
19. 8722  
20. 9801

## No. 316

1.  $\frac{1}{10}$   
2.  $\frac{2}{10}$   
3.  $\frac{1}{10}$   
4.  $\frac{2}{10}$   
5.  $\frac{1}{10}$   
6.  $\frac{2}{10}$   
7.  $\frac{1}{10}$   
8.  $\frac{2}{10}$   
9.  $\frac{1}{10}$   
10.  $\frac{2}{10}$

## No. 317

1.  $1\frac{1}{40}$   
2.  $1\frac{2}{40}$   
3.  $\frac{1}{40}$   
4.  $1\frac{1}{40}$   
5.  $1\frac{2}{40}$   
6.  $1\frac{1}{40}$   
7.  $\frac{2}{40}$   
8.  $\frac{1}{40}$   
9.  $1\frac{1}{40}$   
10.  $1\frac{2}{40}$

## No. 318

1.  $\frac{1}{10}$   
2.  $\frac{2}{10}$   
3.  $\frac{1}{10}$   
4.  $\frac{2}{10}$   
5.  $\frac{1}{10}$   
6.  $\frac{2}{10}$   
7.  $\frac{1}{10}$   
8.  $\frac{2}{10}$   
9.  $\frac{1}{10}$   
10.  $\frac{2}{10}$

## No. 319

1. 41  
2. 51  
3. 61  
4. 71  
5. 81  
6. 91  
7. 31  
8. 41  
9. 51  
10. 61  
11. 71  
12. 81  
13. 91

14. 31  
15. 41  
16. 51  
17. 61  
18. 71  
19. 81  
20. 91

## No. 320

1.  $\frac{1}{40}$   
2.  $\frac{2}{40}$   
3.  $\frac{1}{40}$   
4.  $\frac{2}{40}$   
5.  $\frac{1}{40}$   
6.  $\frac{2}{40}$   
7.  $\frac{1}{40}$   
8.  $\frac{2}{40}$   
9.  $\frac{1}{40}$   
10.  $\frac{2}{40}$

## No. 321

1.  $\frac{1}{40}$   
2.  $\frac{2}{40}$   
3.  $\frac{1}{40}$   
4.  $\frac{2}{40}$   
5.  $\frac{1}{40}$   
6.  $\frac{2}{40}$   
7.  $\frac{1}{40}$   
8.  $\frac{2}{40}$   
9.  $\frac{1}{40}$   
10.  $\frac{2}{40}$

## No. 322

1. 42  
2. 52  
3. 62  
4. 72  
5. 82  
6. 92  
7. 32  
8. 42  
9. 52  
10. 62  
11. 72  
12. 82  
13. 92  
14. 32  
15. 42  
16. 52  
17. 62  
18. 72  
19. 82

20. 92

## No. 323

1.  $1\frac{13}{10}$
2.  $1\frac{13}{10}$
3.  $1\frac{13}{10}$
4.  $1\frac{13}{10}$
5.  $1\frac{13}{10}$
6.  $1\frac{13}{10}$

## No. 324

1.  $\frac{3}{8}$
2.  $\frac{3}{8}$
3.  $\frac{1}{10}$
4.  $\frac{3}{10}$
5.  $\frac{7}{10}$
6.  $\frac{7}{10}$
7.  $\frac{1}{8}$
8.  $\frac{3}{8}$
9.  $\frac{3}{8}$
10.  $\frac{3}{8}$

## No. 325

1. 43
2. 53
3. 63
4. 73
5. 83
6. 93
7. 33
8. 43
9. 53
10. 63
11. 73
12. 83
13. 93
14. 33
15. 43
16. 53
17. 63
18. 73
19. 83
20. 93

## No. 327

1.  $\frac{1}{10}$
2.  $\frac{3}{10}$
3.  $\frac{7}{10}$
4.  $\frac{9}{10}$
5.  $\frac{1}{8}$

6.  $\frac{3}{8}$
7.  $\frac{3}{8}$
8.  $\frac{3}{8}$
9.  $\frac{1}{10}$
10.  $\frac{1}{10}$

## No. 328

1. 44
2. 54
3. 64
4. 74
5. 84
6. 94
7. 34
8. 44
9. 54
10. 64
11. 74
12. 84
13. 94
14. 34
15. 44
16. 54
17. 64
18. 74
19. 84
20. 94

## No. 330

1.  $\frac{1}{10}$
2.  $\frac{1}{10}$
3.  $\frac{1}{10}$
4.  $\frac{1}{10}$
5.  $\frac{1}{10}$
6.  $\frac{1}{10}$
7.  $\frac{1}{10}$
8.  $\frac{1}{10}$
9.  $\frac{1}{10}$
10.  $\frac{1}{10}$

## No. 331

1. 45
2. 55
3. 65
4. 75
5. 85
6. 95
7. 35
8. 45
9. 55
10. 65
11. 75
12. 85

13. 95
14. 35
15. 45
16. 55
17. 65
18. 75
19. 85
20. 95

## No. 332

1. 46
2. 56
3. 66
4. 76
5. 86
6. 96
7. 36
8. 46
9. 56
10. 66
11. 76
12. 86
13. 96
14. 36
15. 46
16. 56
17. 66
18. 76
19. 86
20. 96

## No. 333

1.  $\frac{1}{10}$
2.  $\frac{1}{10}$
3.  $\frac{1}{10}$
4.  $\frac{1}{10}$
5.  $\frac{1}{10}$
6.  $\frac{1}{10}$
7.  $\frac{1}{10}$
8.  $\frac{1}{10}$
9.  $\frac{1}{10}$
10.  $\frac{1}{10}$

## No. 334

1. 47
2. 57
3. 67
4. 77
5. 87
6. 97
7. 37
8. 47
9. 57

10. 67
11. 77
12. 87
13. 97
14. 37
15. 47
16. 57
17. 67
18. 77
19. 87
20. 97

## No. 335

1.  $\frac{3}{8}$
2.  $\frac{3}{8}$
3.  $\frac{1}{10}$
4.  $\frac{3}{10}$
5.  $\frac{7}{10}$
6.  $\frac{7}{10}$

## No. 336

1. 48
2. 58
3. 68
4. 78
5. 88
6. 98
7. 38
8. 48
9. 58
10. 68
11. 78
12. 88
13. 98
14. 38
15. 48
16. 58
17. 68
18. 78
19. 88
20. 98

## No. 337

1. 49
2. 59
3. 69
4. 79
5. 89
6. 99
7. 39
8. 49
9. 59
10. 69

11. 79
12. 89
13. 99
14. 39
15. 49
16. 59
17. 69
18. 79
19. 89
20. 99

## No. 338

1.  $.12\frac{1}{2}$
2.  $.37\frac{1}{2}$
3.  $.62\frac{1}{2}$
4.  $.87\frac{1}{2}$
5.  $.33\frac{1}{2}$
6.  $.66\frac{1}{2}$
7.  $.16\frac{1}{2}$
8.  $.83\frac{1}{2}$
9. .20
10. .40
11. .60
12. .80

## No. 339

1. 2886
2. 5994
3. 9268
4. 12818
5. 17081
6. 19584
7. 23793
8. 28288
9. 24466
10. 4104

## No. 340

1.  $.06\frac{1}{2}$
2.  $.18\frac{1}{2}$
3.  $.31\frac{1}{2}$
4.  $.43\frac{1}{2}$
5.  $.56\frac{1}{2}$
6.  $.68\frac{1}{2}$
7.  $.81\frac{1}{2}$
8.  $.93\frac{1}{2}$
9.  $.08\frac{1}{2}$
10.  $.41\frac{1}{2}$
11.  $.58\frac{1}{2}$
12.  $.91\frac{1}{2}$
13.  $.03\frac{1}{2}$
14.  $.04\frac{1}{2}$

## No. 341

1. 4235
2. 8352
3. 12691
4. 17138
5. 21918
6. 25543
7. 30702
8. 36206
9. 33355
10. 5796

## No. 342

1. \$17887
2. \$9818
3. 9865
4. 25775
5. 39540
6. 23332
7. 17313
8. 31383
9. \$14822.40
10. 243062

## No. 343

1. 5764
2. 10890
3. 16238
4. 21808
5. 27408
6. 30968
7. 37893
8. 44408
9. 42284
10. 7740

## No. 344

1. .0625
2. .1875
3. .3125
4. .4375
5. .5625
6. .6875
7. .8125
8. .9375
9.  $.0833\frac{1}{3}$
10.  $.4166\frac{2}{3}$
11.  $.5833\frac{1}{3}$
12.  $.9166\frac{2}{3}$
13.  $.0312\frac{1}{2}$
14.  $.0416\frac{2}{3}$

## No. 345

1. 7473
2. 13608
3. 19965
4. 26544
5. 33345
6. 37178
7. 44368
8. 52643
9. 51622
10. 9990

## No. 346

1. \$99.84
2. 96256
3. \$117.76
4. 98304
5. 1728
6. \$675.84
7. \$8120.60
8. \$30402.55

## No. 347

1. 9362
2. 16506
3. 23872
4. 31460
5. 39270
6. 43952
7. 51748
8. 60168
9. 60946
10. 12222

## No. 348

1. .03125
2. .09375
3. .15625
4. .21875
5. .28125
6. .34375
7. .40625
8. .46875
9. .53125
10. .59375
11. .65625
12. .71875
13. .78125
14. .84375
15. .90625
16. .96875
17. .04167

18. .20833
19. .29167
20. .45833
21. .54167
22. .70833
23. .79167
24. .95833

## No. 349

1. 10011
2. 18144
3. 26499
4. 35076
5. 43875
6. 52896
7. 57519
8. 66378
9. 68302
10. 12456

## No. 350

1. \$424575
2. \$84770
3. \$733779.50
4. \$26863.20
5. \$830062.74
6. \$526.32
7. \$981088
8. \$9603
9. \$1007010

## No. 351

1. 10349
2. 19602
3. 28946
4. 38512
5. 48300
6. 58310
7. 68542
8. 72906
9. 74339
10. 12312

## No. 353

1. 12408
2. 22428
3. 33033
4. 43608
5. 54405
6. 65424

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7. 70965
8. 82368
9. 85272
10. 15219

## No. 354

1. \$525
2. \$756
3. \$384
4. \$810
5. \$5400
6. \$900
7. \$13000
8. \$14700
9. \$7200
10. \$1600
11. \$630
12. \$12600
13. \$1200
14. \$1200
15. \$1200

## No. 355

1. 14440
2. 25248
3. 36278
4. 47530
5. 59004
6. 61465
7. 72768
8. 84293
9. 95354
10. 19206

## No. 357

1. 11211
2. 24642
3. 40051
4. 57902
5. 77691
6. 92412
7. 116081
8. 142272
9. 170321
10. 29032

## No. 358

1. \$247715.70
2. \$243540
3. \$60226335
4. \$1087638.75

5. \$5209451.52
6. \$131602.24
7. \$40102686.72
8. \$8710669

## No. 359

1. 24442
2. 49184
3. 76146
4. 104632
5. 136004
6. 156996
7. 191522
8. 229024
9. 268746
10. 47012

## No. 361

1. 39693
2. 75746
3. 114019
4. 154512
5. 195853
6. 223096
7. 269709
8. 318542
9. 368063
10. 67596

## No. 362

1. 138138
2. 115596
3. 74556
4. 186960
5. 89301
6. 235872
7. 119782
8. 73248
9. 193256

## No. 363

1. 56964
2. 104328
3. 153912
4. 205716
5. 259740
6. 291014
7. 348928
8. 409062
9. 471416
10. 91390

## No. 364

1. 210
2. 342
3. 255
4. 240
5. 195
6. 247
7. 272
8. 224
9. 361

## No. 365

1. 76255
2. 134930
3. 195825
4. 258940
5. 324275
6. 364080
7. 429965
8. 501400
9. 575055
10. 115430

## No. 366

1. \$56496
2. \$799018
3. \$5663152
4. \$410091.55
5. \$453952.95
6. \$36033.25
7. \$530895.75
8. \$1043606.30

## No. 367

1. 85446
2. 155232
3. 227238
4. 301464
5. 377910
6. 456576
7. 497502
8. 575276
9. 659932
10. 120408

## No. 368

1. \$139510.50

2. \$147804.75
3. \$158233.30
4. \$131011.65
5. \$452339.40
6. \$754503.75
7. \$151524.65
8. \$238939.80

## No. 369

1. 92617
2. 173514
3. 256631
4. 341968
5. 429525
6. 519302
7. 611299
8. 651126
9. 740567
10. 121144

## No. 370

1. 5476
2. 8649
3. 6724
4. 4096
5. 1444
6. 12544
7. 15376
8. 21316
9. 28224
10. 38809
11. 1236544
12. 1471369
13. 1726596
14. 2298256
15. 2954961

## No. 371

1. 113928
2. 206136
3. 300564
4. 397212
5. 496080
6. 597168
7. 648396
8. 753324
9. 860472
10. 153558

## No. 372

1. 7616

2. 12561
3. 15824
4. 22425
5. 40716
6. 42749
7. 421056
8. 224196
9. 198989

## No. 373

1. 138168
2. 241697
3. 347446
4. 455415
5. 565604
6. 620473
7. 734502
8. 850751
9. 962297
10. 183816

## No. 374

1. 8556
2. 4030
3. 7308
4. 8924
5. 45795
6. 100152
7. 173888
8. 264171
9. 837221

## No. 375

1. 2025
2. 3025

3. 4225
4. 5625
5. 7225
6. 9025
7. 13225
8. 18225
9. 24025
10. 30625
11. 38025
12. 99225
13. 112225
14. 126025
15. 140625

## No. 376

1. 621
2. 2009
3. 1224
4. 11021
5. 13216
6. 24024
7. 30616
8. 27209
9. 38016

## No. 377

1. 275625
2. 390625
3. 680625
4. 1050625
5. 1500625
6. 1755625
7. 2640625
8. 2975625

9. 3330625
10. 3705625

## No. 378

1. 4896
2. 6391
3. 8084
4. 12019
5. 16851
6. 22484
7. 25536
8. 32351
9. 36036

## No. 379

1.  $90\frac{3}{4}$
2.  $112\frac{2}{25}$
3.  $160\frac{5}{12}$
4.  $339\frac{1}{6}$
5.  $12\frac{3}{8}$
6.  $3681\frac{2}{25}$
7.  $1625\frac{3}{32}$
8.  $650\frac{1}{25}$
9.  $28\frac{1}{8}$
10.  $721\frac{1}{2}$
11.  $42\frac{1}{4}$
12.  $152\frac{1}{81}$

## No. 380

1. 276
2. 800
3.  $929\frac{1}{3}$
4. 950

5. 2552
6. 5952
7. 1422
8. 2100
9. 3363

## No. 381

1. 23.2
2. 45
3. 36
4. 3.5
5. 5.12
6. 13.05
7. 10.18
8. 61.2
9. 77.6

## No. 382

1. 2744
2. 19683
3. 35937
4. 97336
5. 205379
6. 238328
7. 274625
8. 357911
9. 389017
10. 592704
11. 636056
12. 681472
13. 857375
14. 912673
15. 970299



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